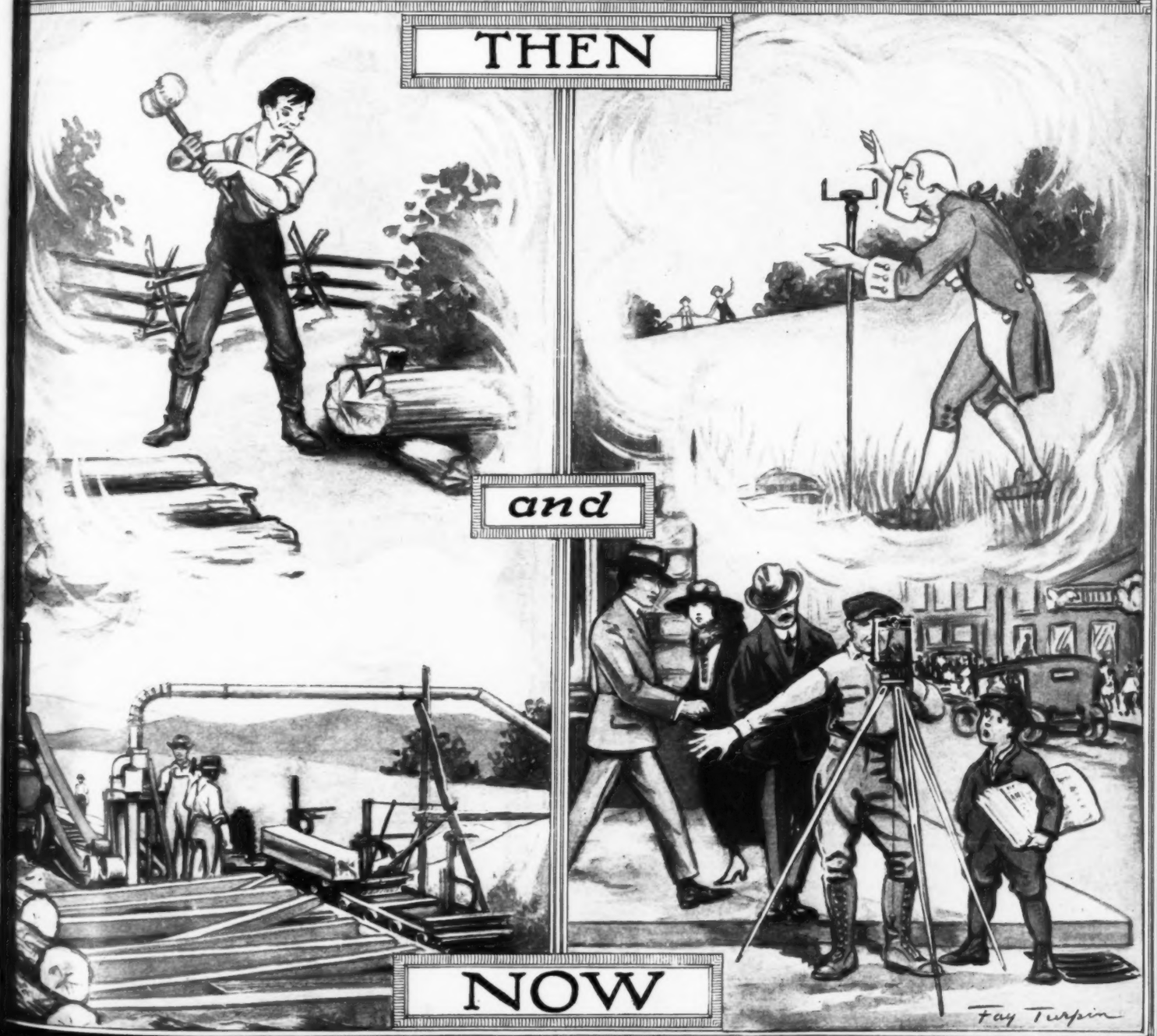
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

VOL. 2 FEBRUARY — 1920 NO. 2



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If you have any material handling problems it's your next move to investigate the B-G Conveyor. For short-hauling you will find this machine moving material at a lower cost per-foot-ton than any other method. You can't afford to delay in learning how successfully it is now doing the job in hundreds of cases.

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B-G Standardized Conveyors are soundly built—portable and stationary types—lengths 12 to 60 feet—equipped with electric drive; supplied with gasoline engine when required—operating costs low—working capacity up to 150 tons per hour. For all short hauling B-G Standardized Conveyors are a means of saving in cost and speeding your work.

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Successful Methods

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THEN AND NOW

The youthful Washington with his eighteenth century surveying instruments working among the Virginia hills, and the young Lincoln splitting rails on the Illinois prairies, are the people's favorite embodiments of the pioneer spirit that has been so potent a factor in giving this nation such a prominent place in the world's affairs. Both helped in their day and generation to advance the frontier, to transform the wilderness into a place of human habitation.

In the time that has passed between "Then and Now" much progress has been made. THEN a blazed trail or a muddy road appeared to suffice, but NOW a well drained and surfaced road is demanded. THEN hand labor was the only means at hand to do the task, but NOW numerous are the machines that increase the efficiency of the present day road builders. Progress is ever progressive. Only yesterday it was the universal practice to dump materials on the finished subgrade, but now the up-to-the-minute contractor employs a narrow gauge railway and dump cars to haul the stone, sand and cement along the roadway, thus minimizing handling costs. Yesterday it was the custom to let only a few miles of road construction under a single contract, but NOW many miles — yes, sometimes 30 miles and more are included in a single bidding and letting.

Time was when the average contractor kept his office in his hat, but NOW the successful man plans his work, figures his costs and keeps his records just as carefully as any factory manager.

And why shouldn't he?—Is not the task of road building similar to that of running a factory? Stone, sand, cement, etc. are the raw materials and the completed road is the finished product.

The mission of Successful Methods, as a magazine of construction service, is to bring to its readers each month illustrations and descriptions of better ways and new machines that have been profitably used in contruction work. Its aim is to publish articles that will help its readers really to belong to the "NOW" time.

This Issue Has More Than 75,000 Circulation.
This Magazine Will Be Sent To Men Who Can Use It.

EDITORIALS

Get Busy Now

THERE is much more to say about the *now* time than is set forth on the preceding page. All the improved machines or better methods in the world will not make today any better than yesterday if they are allowed to stand idle. To make the *now* time worth while it must be used.

Just at present too big a proportion of the readers of SUCCESSFUL METHODS are marking time, waiting for the construction season to begin. It is the slack time of year; the days when real hard and speedy work will be necessary seem far off. It is hard to roll up one's sleeves and get busy when the job is a couple of months away.

But the men who get busy now are going to find themselves several laps ahead of their more easy going fellows when the construction season opens. In the January issue of SUCCESSFUL METHODS the Nation's road-building plans were published. In several instances the state engineers prefaced their remarks by saying that although they have the money to spend they doubt whether they will be able to spend it because of the lack of machines, materials and men.

There they are—the three M's, and what are you doing about them? If you have obtained a road contract and intend to begin work in April, have you bought the *machines* with which to do it? Have you the *materials* contracted for to keep your machines busy when you get them? And have you the *men* to operate the machines and to do the work that even a modern machine cannot do?

If your answer to all three of these questions is "Yes," SUCCESSFUL METHODS will content itself with patting you on the back and crying "Good Work," but if your reply is "No," SUCCESSFUL METHODS, in its role of your true friend, urges you with all the vigor at its command to *"Get Busy Now."*

Earning Its Keep

EVERY contractor and engineer knows that the machine that is not kept at work is, to use the old horse-owner's phrase, "eating its head off." An idle machine is likely to develop into a liability instead of remaining an asset.

The realization of this fact has made more than one man hesitate a long time before purchasing a machine which he really ought to have. This is especially true in the case of big, heavy machines that look almost like fixtures when they settle down to a job of work. The mere thought of the time needed to move them from one place to another with its resulting loss of earning time makes cold chills run down the back of the intending purchaser.

That is why the article describing a month's work of a steam shovel, which appears on another page of this issue of SUCCESSFUL METHODS, is of so much interest. If a big, twenty-ton shovel can jump from job to job with the celerity stated in the article, the time-lost-in-moving bugaboo loses most of its terrors.

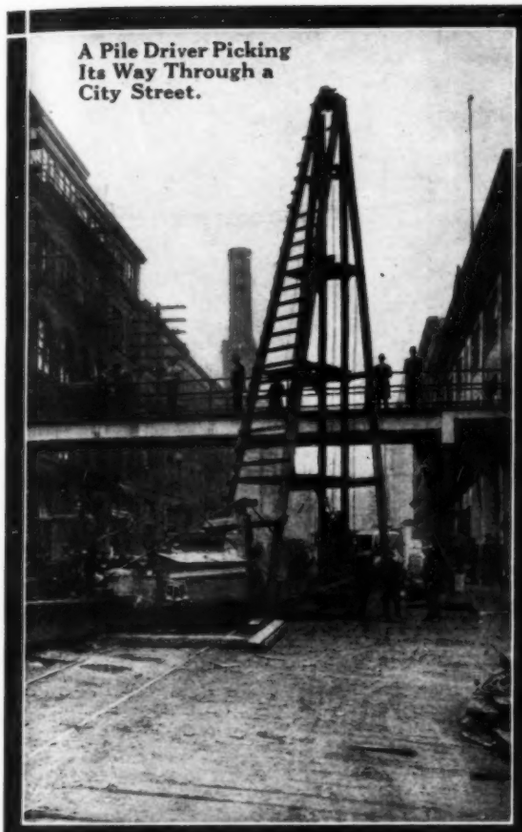
The war taught us that "digging in" meant the preparation of a fairly permanent halting place. Not so with this steam shovel, however. It popped right out again as soon as the digging in was completed and was off to another job in the course of a few minutes.

Modern machinery is made to work, not to loaf. The manufacturer who doesn't realize that fact doesn't deserve to succeed. The progressive manufacturer has men in his organization whose duty it is to study the needs of prospective buyers and who won't recommend the purchase of a machine that is too big for the buyer's needs or will be idle most of the time. They are a sort of insurance against unwise buying.

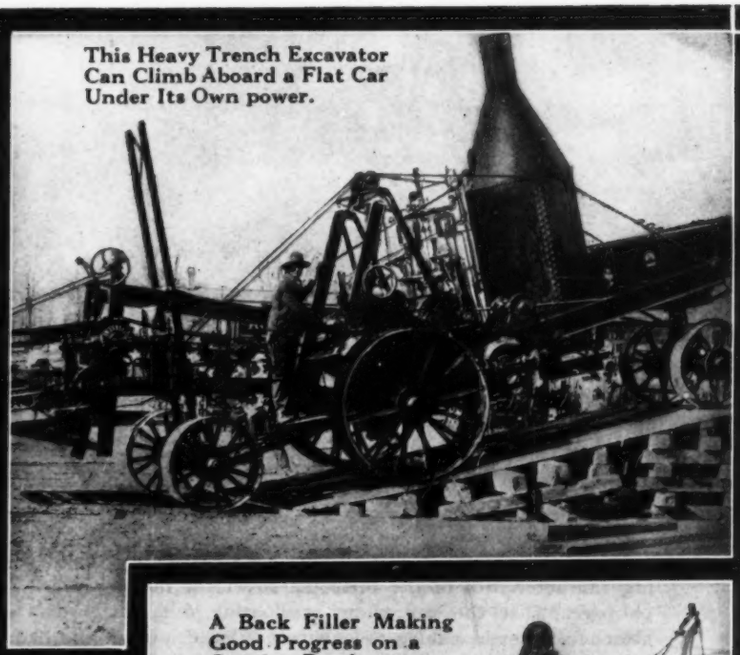
Study your needs, call upon these men for advice and when you get the machine you need, keep it busy.

THE STEAM SHOVEL DESCRIBED ON PAGE 8 EMERGING FROM CELLAR

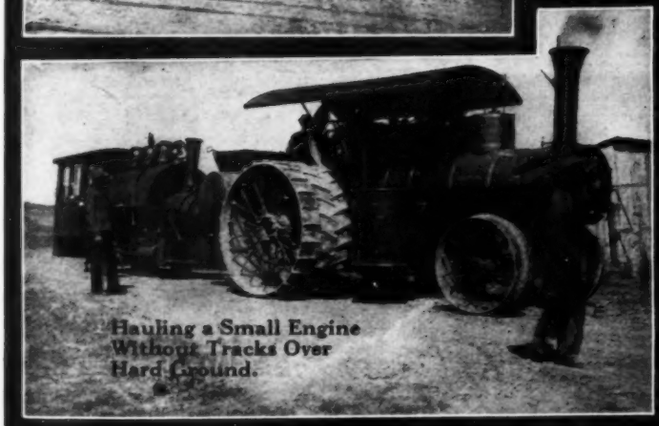
Moving Pictures



A Pile Driver Picking Its Way Through a City Street.



This Heavy Trench Excavator Can Climb Aboard a Flat Car Under Its Own power.



Hauling a Small Engine Without Tracks Over Hard Ground.

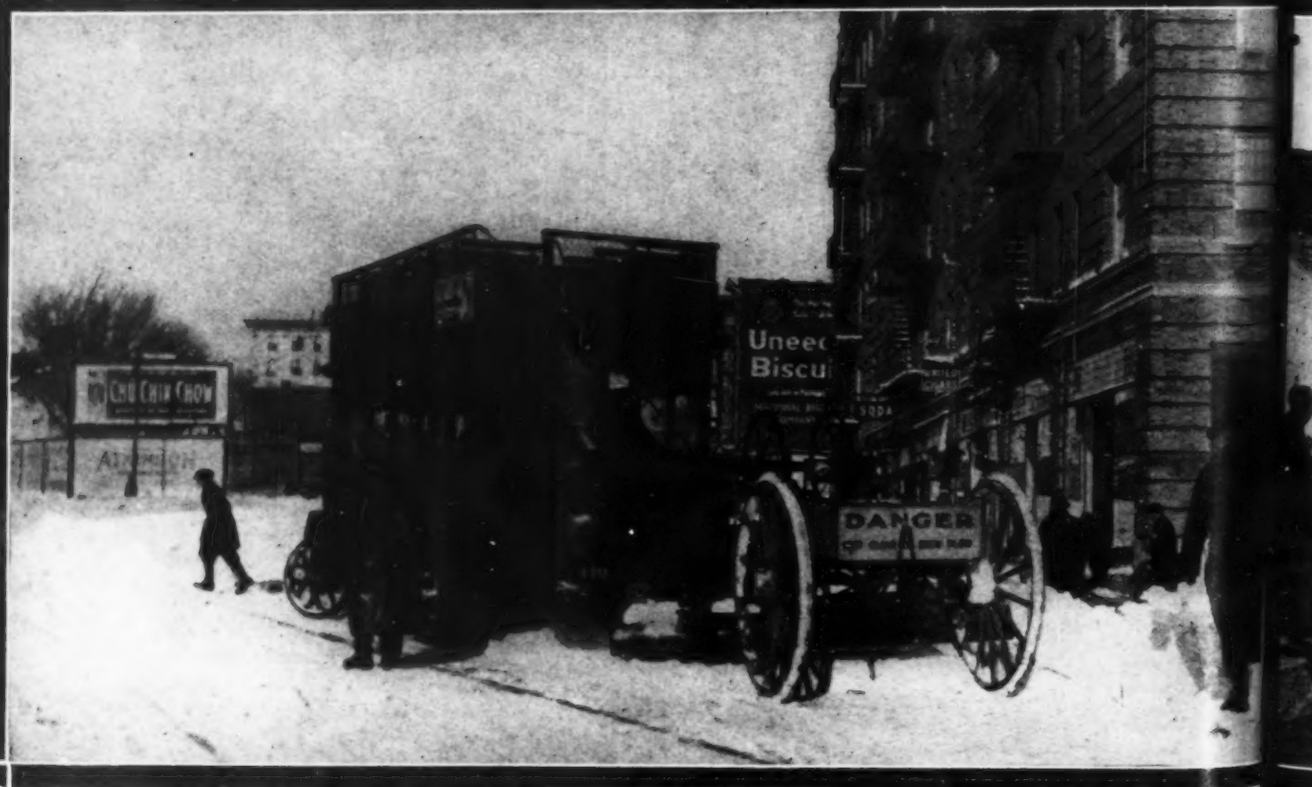
A Back Filler Making Good Progress on a Country Road.

Moving a Steam Shovel From Town to Town.

Some Easy Jobs at Home

Misbehavior and mischief have been two of the distinguishing characteristics of the Missouri River for many years. The photograph at the top shows a floating dike made of trees attached by steel cables to concrete piles driven in the bed of the stream. At the right, a stretch of the shore line showing the dike in the distance and how it has preserved the bank from further erosion.

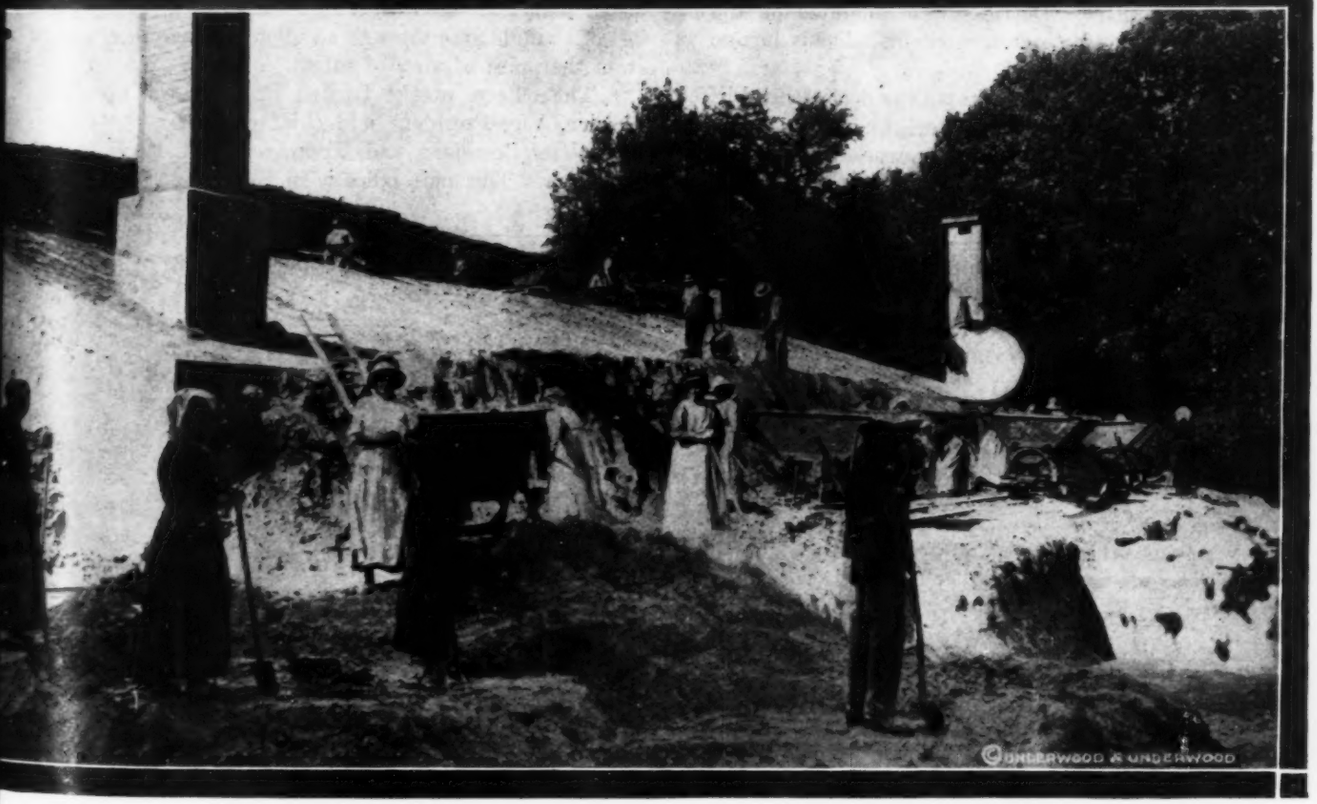
At the bottom of the page a Fifth Avenue bus spends a wintry morning hauling a snow plow through New York City streets.



And Some Hard Ones Abroad

The hazards that beset engineering work in the tropics are well illustrated in the photographs to the left and at the top of this page. One shows the door of an American company's office in Santo Domingo, the morning after a revolution. The marks were made by bullets. The other shows how harshly a tropical storm treats a concrete culvert.

Germany furnishes the picture below. Building materials and labor are so scarce that women are helping demolish a fort on the outskirts of Berlin to get concrete and stones for new houses.



CLEVELAND'S BIG PUBLIC HALL

Steelwork Completed on Great Auditorium and Heavy Erecting Equipment Moved in Jig Time by Novel Method

ONE of the biggest construction jobs now in progress in the Middle West is the putting up of the new Auditorium or Public Hall owned by the city of Cleveland. The United Erecting Company of Cleveland is in charge of the steel construction and has been engaged on the job since March, 1919. It is now practically completed.

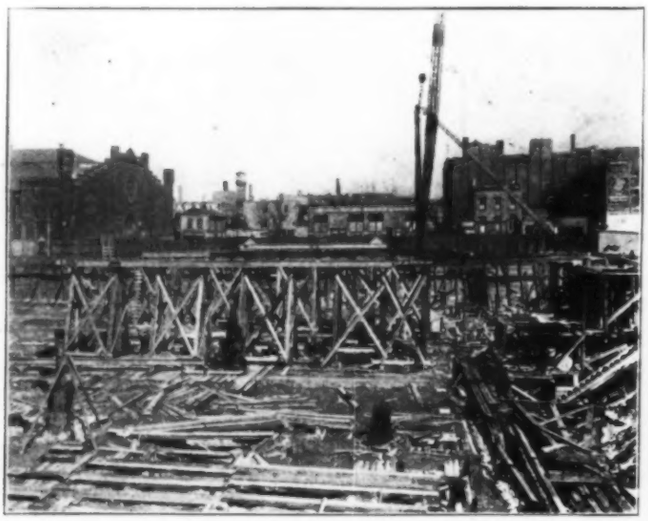
The installation of about 17 steel trusses 213 ft. in length and each weighing about 15 tons was the biggest problem that J. L. Frazier, Vice-President of the company and engineer in charge, had to solve. The photographs of the work on this and the following page show how he did the job. Four wooden trestles were built to carry runways and on them were placed 2 steel towers, back of which was wooden false work on which the men worked while putting the trusses in place. Derricks were mounted on top of the steel towers and were operated by 2 hoists housed at the base of the towers.

ONE OF THE ERECTING TOWERS COMPLETE AND THE OTHER UNDER WAY

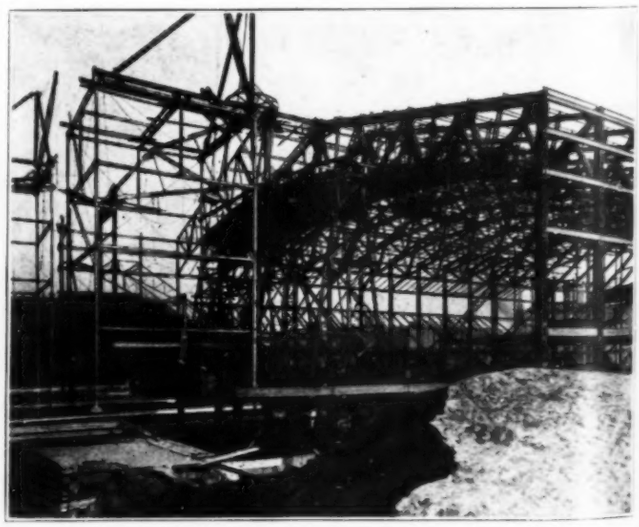
These hoists not only operated the derricks and lifted some single pieces weighing as much as 55 tons, but were employed by Mr. Frazier for the purpose of moving the steel erecting towers and wooden false work whenever a truss was completed and it was necessary to put up the next one. The cable running to the bull wheel of each derrick was detached and fastened to the bottom of the wooden false work, then to the steel towers and finally passed through sheaves attached to the runways, as shown in the photograph. Both towers and false work rest on small rollers, and when the hoists were set in motion, moved as a unit to the new position. The whole operation of moving the unwieldy equipment required only about 15 min.

This plan of moving towers and false work together proved a most valuable money and time saver. As soon as it was completed the cables would be restored to their normal position and the hoists would immediately resume their regular job of lifting the heavy girders. The task of erecting the steel work, which lasted about 10 months, was accomplished without the loss of a single man through accident, a remarkable record from the point of view of safety.

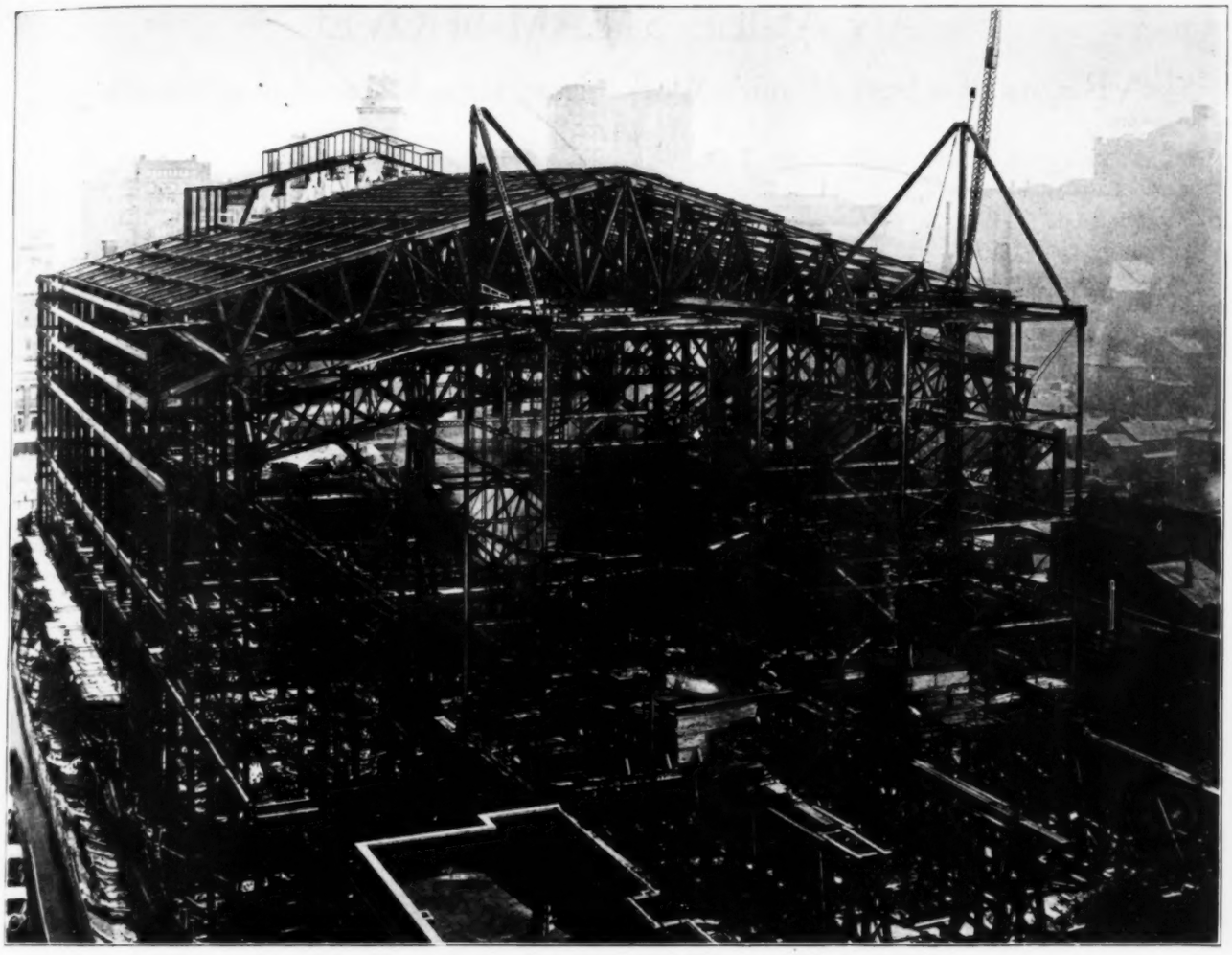
The officers of the United Erecting Co. are J. L. Frazier, Vice-President and chief engineer; J. O. Barnett, Vice-President and Treasurer, and L. L. Skeel, Secretary. The main office is in Cleveland.



THE FIRST STEP—PUTTING UP THE RUNWAYS



THE LAST STEP—TAKING DOWN THE FALSE WORK



GENERAL VIEW OF THE CLEVELAND AUDITORIUM IN OCTOBER, 1919.
ALL BUT ONE OF THE BIG TRUSSES IN PLACE

The building when finished will be 213 by 366 feet, and contain about 4,000 tons of steel. It is situated at the corner of Lakeside Avenue and 6th Street and will hold from 9,000 to 12,000 persons.

When completed it will be used for all sorts of civic gatherings and will afford a fit meeting place for the people of Cleveland when great public questions are to be discussed. It is a type of building that every city needs.

PROTECT YOUR BLUE PRINTS

Blue prints have a bad habit of getting dirty, wet, greasy or torn while being handled by workmen using them and a sufferer from this habit has designed a practical blue-print protector of simple construction and low cost. A sheet of transparent sheeting—the same material used for lights in auto curtains—is cut to desired size. A piece of light-weight, water-proof flexible material is then cut about a half inch larger all around than the piece of sheeting. This extra half inch allows for a lapover on all but the top side of the protector. A sewing machine stitches the lap down to the sheeting, forming a large flat pocket, open at the top for the insertion of the blue prints.

Both the transparent front and the coated fabric back are water-proof and grease-proof. Dirt or grease may be wiped or washed off easily. The holder may be rolled up if desired in the same way an unprotected blue print usually is handled by a workman.

REMOVE SNOW FROM ROADS

The importance of removing snow from highways cannot be overemphasized. Highway engineers all over the country are beginning to realize the necessity of keeping the roads, especially the trunk lines, open through the winter months.

Keeping the way open for traffic is not the only reason for the removal of snow. The melting of snow on the roadbed tends to soften the subgrade and loosen the base under the wearing surface. In the past much money has been spent in the spring on repairs that could have been avoided by keeping the roads clear of snow.

A CORRECTION

In the article entitled "Modern Highway Building in Minnesota," which appeared on page 18 of the December issue of SUCCESSFUL METHODS, it was stated that the width of the pavement being constructed on the Jefferson Highway near Osseo, Minn., was 15 ft., when as a matter of fact, it is 20 ft. The mixture is 1:2½:4 and 1:2½:5.

AN AGILE STEAM SHOVEL

A Record of a Busy Month's Work—Lost Time Reduced to a Minimum

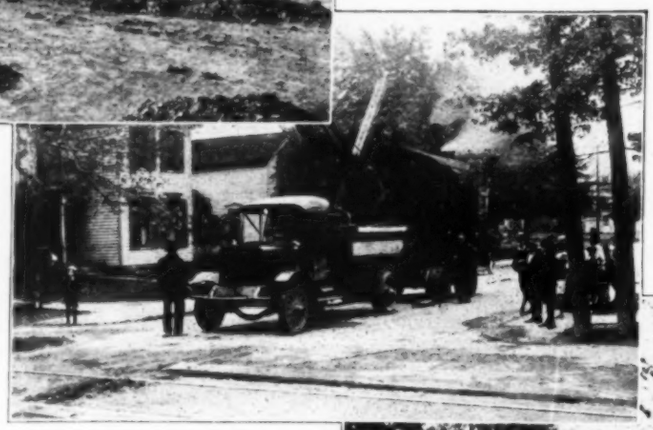
By D. D. Deeds

A STEAM shovel is such a heavy and ponderous looking affair that words like activity and versatility seem out of place when applied to it. But the record of a month's work accomplished by a steam shovel owned by the Ohio Engineering Co. of Lorain, O., shows that even a big power shovel can possess both of the qualities named.

This shovel, which was equipped with a ¾-yd. bucket, began work on October 1 on Eleventh street in Lorain. It worked there until October 6, and during its 5½ days of activity of 9 hours each, excavated about 3,425 cu. yd. The excavation included 2,890 ft. of street 32 ft. wide to a depth of about 12 in. This was at the rate of more than 58 lineal ft. per hour and 68 cu. yd. per hour.

LAKEVIEW PARK

When this job was finished the shovel was moved 1½ miles in 40 min., the method of moving being shown in the center picture on this page. It was taken to the Lakeview Park allotment where some winding streets were being constructed in a new residence section and was put to work digging a street 26 ft. wide, 1,200 ft. in length, describing a semi-circle This street also was excavated to a depth of 12 in. and the work was completed in 4½ days of 9 hours each.



A QUICK JUMP

The shovel's next place of business was on Reid Ave., Lorain, more than 2 miles away, and the move this time consumed 1 hour. It was another street excavation job, but not so big a one as the street was only 20 ft. wide, although it had to be excavated to a depth of 16 in. The shovel dug 1,250 ft. of this street in 4 days (Oct. 13-17).

At the conclusion of this work another jump was made to Thirteenth street and Long Avenue, 4 blocks away. The shovel began work there 47 min. after it had left its previous location. The work on Thirteenth street required digging to a depth of 18 in., and in the time between noon on October 17 and 4 p. m. on October 18 the shovel excavated the street 30 ft. wide for a distance of 3,500 ft.

Having had enough street work for a while, the shovel turned its attention on October 20 to the excavation of a basement. This job involved the removal of 2,200 cu. yd. of dirt which was accomplished in 5 days. The basement was dug to a depth of 9 ft., and 30 min. after the last bucketful of earth had been loaded into the wagon the big shovel had turned around and climbed out of the cellar surmounting a 20-ft. grade.

After this taste of basement digging, the shovel returned to Reid avenue, going 8/10 of a mile in 13 min. It began work on Monday, October 27, and in 5 days established the remarkably good record of 3,484 lineal ft. in a street 20 ft. wide excavated to a depth of 12 in. This was an average of 697 ft. per day or nearly 80 ft. per hour.

The month of work was rounded out between November 1 and 6. Eleven hundred feet of street 28 ft. wide were excavated to a depth of 18 in. This finished the preparation of the subgrade for Lorain's 1919 paving program.

Having done all it could in Lorain the shovel was sent to Elyria, a distance of 9.2 miles, where there was some work which had to be finished before the really cold weather set in. The trip began at 1 p. m. on November 7 and at 5:15 p. m. the shovel was in Elyria ready to start work on the following morning.

AT WORK ON REID AVENUE

The method of moving the shovel on the longer trip is illustrated on page 3 of this issue. The dipper was placed in the body of a motor truck which was fastened to the truck of the shovel. Another truck ahead of that carried the tool boxes and did most of the pulling. One truck did the hauling on the shorter trips in Lorain.

ROAD ENGINE CLEARS THE WAY

Pulls Stumps and Removes Small Grove of Trees---Doesn't Mind Mud

CLEARING out trees and stumps is one of the first jobs that confronts the maker of a new road, and there are various ways of doing it. The accompanying photograph shows a double-cylinder steam road engine engaged in cleaning out a grove of locust trees preparatory to opening up a new section of land and building a road.

The job was done on a wet day when the ground was soft, a fact which is evidenced by the mud caked between the cleats on the drive wheels of the machine, which may be seen plainly in the photograph above.

The trees in the grove were none of them large but they were well rooted, in one case roots 30 feet in length being encountered. The road engine took care of the 30-footers as well as it did of the shorter ones, although a little harder pull was necessary to get them out of the ground.

The whole job was a rather unusual one for a steam road engine of this type, but, nevertheless, it was quickly and efficiently done.

HOW TO SPLICE ROPE

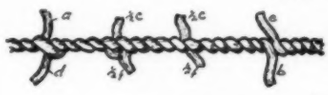
THE following directions for making splices in ropes are taken from a circular issued recently by the National Safety Council:

Short Splice

First unlay the strands of each rope to a convenient length and butt together the rope ends, having each strand of one rope lie between the two consecutive strands of the other rope. The strands of one rope should be drawn along the second rope and grasped in one hand. Then weave the free strands of the second rope in the strands of the first rope, working in a direction opposite to the twist of the rope. Similarly weave the strands of the first rope. and after continuing the process as far as desired, cut off the loose ends of strands. By cutting out a few fibres of a strand each time it is worked through the rope, the splice may be neatly tapered. The splice should be made smooth and compact by rolling under the foot.

Short Splice

Starting a Splice



Long Splice

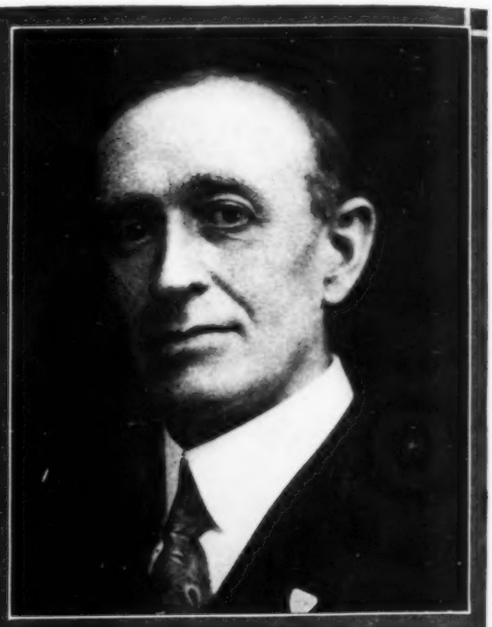
Eye Splice

Long Splice

Butt the rope ends together as described in making short splice. Unlay a strand of one rope to any desired length and lay in its place the nearest strand of the other rope, tying or tucking in the ends. Do the same with another pair of strands in the opposite direction. The remaining pair of strands is then laid in one direction as above, the other half being laid in the split so that half is laid in each direction.

Road Builders

After being graduated from the Civil Engineering Course at the University of Maine in 1896, **Paul D. Sargent,** Chief Engineer of the **Maine** Highway Department, spent two years in general municipal work and five years in railroad engineering. In 1905 he was appointed State Commissioner of Highways for Maine, and then he became Assistant Director of the Bureau of Public Roads in the U. S. Department of Agriculture. On August 15, 1913, he became chief engineer for the Maine State Highway Commission and has since held that position.



H. D. Bruning, Chief Engineer of the **Ohio** Highway Department, has had a large and varied experience in the practical and theoretical fields of engineering. The first 16 years following his graduation from the Ohio State University were spent in maintenance and construction work on railroad lines out of Pittsburgh and in educational work. In 1912 he became Division Engineer of the Ohio Highway Department and in 1917 was appointed Chief Engineer in which capacity he will carry out road building plans involving $25,000,000 for 1920.

W. S. Fallis, State Highway Engineer of North Carolina, claims Virginia for his native state. He was educated at the Shenandoah Polytechnic School, New Market, Virginia, and in 1890 began work with the American Bridge and Iron Company at Roanoke. He engaged in private contracting and surveying work from 1892 to 1895, when he became City Engineer and Superintendent of Public Works at Harrisonburg. In 1915 he moved to North Carolina and was appointed to his present position.

Although **H. K. Bishop** is Chief Engineer of the **Indiana** State Highway Commission, his experience was gained largely in New York. In that part of the country he was identified with several big engineering projects, among them the construction work on the enlargement of the Erie Canal. In 1912 he became Superintendent of Public Works of the Territory of Hawaii. He was District Engineer for the Bureau of Public Roads until 1919.

KEEPING TRACK OF FEDERAL AID PROJECTS

Minnesota Has Simple Method of Noting Progress—Welcomes Suggestions from Highway Departments of Other States

By WALTER A. PILCHER

Construction Dept., Minnesota Highway Department.

AT this important period of the good roads movement when the various states are constructing more high class roads than at any previous time, and the majority taking advantage of Government aid to assist in the undertaking, a detailed tabulation of all proceedings and important data has become a necessity with all highway departments. This is especially so in regard to Federal projects, because considerable information has to be transmitted to the Federal engineers as requested in the regulations of the Bureau of Public Roads. It is more important that this data be in as brief and compact a form as possible to enable the engineers always to have the information at hand when wanted.

With this object in view the Minnesota Highway Department has devised a method of issuing its data to engineers on sheets 10½ by 6¾. These sheets are bound in a loose leaf book (pocket size), the sheets being folded twice.

This method of recording proceedings has proved far superior to the card index system, which is bulky and of no use except for an office record, or a code system which does not cover all proceedings. It will be noted from the "Abstract of Proceedings and Data" that there are 22 projects and 49 items of proceedings and data covered for each project. At a glance one can find the present status or other important data on a particular project as for instance, the length, type, cost, Federal aid funds allotted and numerous other items that are referred to daily.

All data received at the office is immediately transferred to a blueprint copy of the abstract and at the end of the week all notations are transferred to a brown line copy and blueprints made for each officer of the department.

As noted on the abstract, item number 2 gives the county number. In order to locate the county name of a given number readily an index of counties has been prepared in blocks of five counties each. For an example, take the first project, which is number 48, the county number being 75. Referring to the index of counties, block number 71, we find that the fifth county in this block, number 75, is Swift county. This is the only information on the abstract for which one has to refer, to any source other than abstract sheet itself.

The Minnesota Highway Department believes that this is the best method yet offered for keeping this important and rather complex data in such shape that it will be readily accessible at all times. It hopes that the system will be of some service to other states which are trying to solve the problem of keeping important data tabulated, and any criticism or suggestions will be welcome.

Abstract of Proceedings and Data on Minnesota Federal Aid Projects No. 48 to No. 69

1	PROJECT NUMBERS	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	
2	COUNTY NUMBERS	75	12	43	18	31	41	37	37	37	4	52	3	70	24	20	74	65	5	6	56	65	63	
3	S.R. NO (T.H. NO)	11 (38)	1 (12)	3 (20)	2 (18)	6 (39)	6 (14)	2 (6)	1	1 (12)	4 (5)	1 (9)	1 (30)	1 (3)	6 (9)	1 (7)	2 (10)	5	4	3 (6)	1 (32)	6 (60)	11 (21)		
4	TYPE	Gr Conc	G 1200	G 1200	G 1200	G 1200	G 1200	G 1200	G 1200	G 1200	G 1200	Conc	G 1200	Conc	G 1200	G 1200	Conc	Conc	G 1200	G 1200	G 1200	G 1200	G 1600		
5	LENGTH (IN MILES)	19	15	4	20	9.5	9	39	6.5	17	30	5.5	4	6.5	12	13	10	14	5	11	4	5	4.3		
6	STATEMENT SUBMITTED	5-6-19	6-7-19	5-2-19	4-3-19	7-8-19	6-9-19	6-2-19	6-2-19	6-2-19	7-8-19	4-2-19	5-1-19	6-1-19	5-3-19	9-4-19	6-2-19	6-8-19	8-1-19	7-3-19	7-5-19	7-2-19	7-5-19		
7	STATEMENT APPROVED	6-2-19	7-3-19	6-3-19	7-5-19	8-7-19		7-8-19	8-7-19	8-9-20	9-2-19		6-9-19	7-31-19	6-30-19	9-7-19	8-2-19	8-1-19		9-9-19	9-7-19	9-5-19	9-20-19		
8	PLANS RECD H.D.	5-2-19	7-9-19		7-7-19	7-8-19	6-16-19	6-9-19	6-11-19	6-2-19	8-1-19	4-4-19	4-3-19	6-5-19	5-22-19		7-21-19	7-7-19	7-28-19	7-22-19	7-28-19	7-30-19	7-3-19		
9	PLANS TO B.P.R. FIRST	5-9-19	7-11-19	5-2-19	9-6-19	8-2-19	7-1-19	7-1-19	7-2-19	7-1-19				7-1-19	6-18-19	10-1-19	8-6-19	8-9-19		9-1-19		8-7-19	8-7-19		
10	PLANS TO B.P.R. SECOND	7-2-19	8-1-19	6-7-19		9-6-19	8-5-19	8-5-19	7-8-19	8-3-19		6-4-19	5-2-19	7-9-19	8-1-19			9-1-19		9-9-19		9-1-19	9-2-19		
11	PLANS TO WASHINGTON	8-6-19		6-9-19		10-9-19	8-9-19	8-9-19	8-7-19	8-9-19		6-9-19	5-7-19	8-1-19				9-3-1		10-1-19		9-3-19	10-1-19		
12	PLANS APPROVED- B.P.R.		8-9-19				9-9-19		9-1-19	9-1-19										10-9-19		10-9-19			
13	DATE OF LETTING	5-2-19	6-10-19	5-22-19	7-3-19	7-4-19	6-2-19	6-2-19	6-2-19	6-3-19	8-7-19	6-3-19	5-6-19	6-6-19	7-8-19	6-3-19	6-6-19	7-9-19		8-6-19	9-5-19	8-19-19	8-2-19		
14	DATE OF LETTING				7-20-19							7-4-19				7-7-19									
15	ADVERTISEMENT REC'D.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
16	ADVERTISEMENT TO B.P.R.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
17	ABSTRACT OF BIDS REC'D.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
18	ABSTRACT OF BIDS TO B.P.R.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
19	CALCULATIONS REC'D.						10-2-19	10-7-19																	
20	AGREEMENT EXECUTED	9-2-19	10-3-19	9-8-19	10-2-19		10-11-19	9-3-19		9-30-19		8-1-19	7-2-19												
21	MOD. "																								
22	EXC. ESTIMATED IN THOUS.	96	114	20		41	90					15	21	32	38			107				33			
23	GRAVEL " " "	15		5		11	11	44	8	20			5		7							6			
24	PAVEMENT " " "	76										58		69				14							
25	EXC. ACTUAL " "																								
26	GRAVEL " " "																								
27	PAVEMENT " " "																								
28	PRELIMINARY ESTIMATE	262	82	15	109	60	104	72	10	33	154	138	13	229	86	81	267	420	28	54	23	26	18		
29	PLAN EST. IN THOUS.	262	83	15	109	51	93	72	10	33		132	18	229	89	85	286	421		82		27	19		
30	COST PER MILE IN THOUS.	14	6	4		5	10	2	1	2		36	4	35	8			33				6	14		
31	CONTRACT PRICE " "	281	56	14		57	43	70	9	32			24	169	89	79	290	394		64	23	23	20		
32	ACTUAL COST " "																								
33	" " PER MILE IN "																								
34	FED. AID ALLOWED " "	120	40	8	54	25	46	30	4	16		60	11	115	42	35	142	150		40	12	13	9		
35	CONTR UNIT PRICE (EXC.)	41	44	36		50							38	49		60	47	60		45	38	47	60		
36	" " " (½" MILE)	95		80		95	85	87	87	87						1.05				1.10		1.00	95		
37	" " " (Tol MILE PT)	1.10		90		1.15	95	95	95	95			1.00			1.15				1.10	90				
38	" " " (CU YD MI)	55		50		95	32	48	40				5			55				50	45		45		
39	" " " (A Stone)											2.74													
40	" " " (B ")	2.45																							
41	" " " (GRAVEL)													2.19			2.34	2.29							
42	" " " (ASPHALT)																								
43	" " " (BRICK)																								
44	WORK STARTED 1918																								
45	WORK STOPPED 1918																								
46	WORK STARTED 1919	7-1-	7-15-	8-15-	8-4-	8-14		8-16				9-8-	6-5-	9-1-	7-31-	9-16-	8-18	8-29		8-18		9-22			
47	WORK STOPPED 1919																								
48	WORK STARTED 1920																								
49	WORK STOPPED 1920																								
50																									

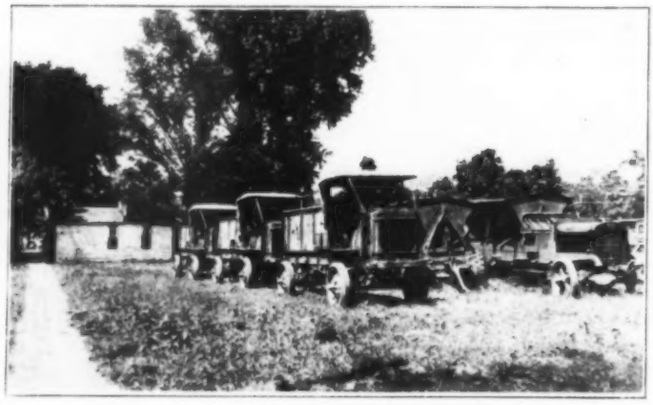
THIS CHART, WITH SMALL COUNTY INDEX, SHOWS PROGRESS OF MINNESOTA'S FEDERAL AID PROJECTS

LABOR VS. MACHINERY ON HIGHWAY WORK

By M. W. Watson
Kansas State Highway Engineer

LABOR for highway work is hard to get today. When the war closed, the government departments urged us to go ahead with highway work to furnish employment for the returned soldiers, and in the passage of the Federal Aid road appropriation bill of 1919, it was definitely specified that returned soldiers, sailors and marines were to be given preference on all road work.

But the special crisis has not developed, and in place of there being a shortage of positions for these men, we have encountered great inconvenience during the entire construction season from labor shortage. The soldiers and sailors were absorbed mainly in their old occupations



ARMY TRUCKS FOR KANSAS ROAD WORK.

and the ones who did not return to their old positions seemed unattracted by road work. The general shortage of labor in this country had created a spirit of unrest among the laborers, in general, and to such an extent that maximum efficiency which was possible under pre-war times is not possible today. The price of common labor has increased from 20c and 25c per hour to 50c and 60c per hour. Sizing up the situation, there seems little possibility of relief in the immediate future. The logical trend is toward the increased use of machinery on road work and the development of new machines.

For our earth work we have been obliged to adopt the machinery formerly used on railroad construction with a few minor adjustments, but highways are different in many respects from railroads. We are usually confined to narrow limits of right of way. The transportation of earth by rail haul permits its being moved long distances at comparatively low cost. On the other hand, the highway does not require the low limiting percentages of grade that is required on the railroad. The highway has, in many instances, been traveled in its present location for years past and by the continued action of the elements and the work of man has become a narrow trench in the center of the right of way, so that the bulk of earth to be moved on the average highway in this middle western country is from the sides of the road to the center.

Many of our county and township officials, who in the main are untrained in the elements of construction, are using more up-to-date machinery than the average contractor. Almost all of our counties own tractors, trucks or some other motive power for drawing a large blade machine, and they use them to good advantage. We frequently find experienced contractors attempting to move this side bank excavation for short lateral distances with the slip scraper at an expense of four or five times what it could be moved with a blade grader and tractor.

Horses, like men, are an uncertain quantity in present-day construction. The war has affected our supply so that we must replace them wherever possible with machinery.

The hauling of materials is also one that is directly related to the supply of teams available and as a substitute for horsepower a number of our contractors have resorted to the use of trucks. The accompanying photograph shows the storage yard at Labette county and the trucks used in the construction of the Federal Aid project in that county.

Industrial railways also are in profitable use. They make it possible to dump material directly into the mixer from batch boxes, thus saving not only team power, but hand labor in shoveling material from the subgrade. This has the further advantage of eliminating from the road construction a great number of pits caused by mud balls coming to the surface of the pavement. These mud balls are practically all the result of shoveling up small portions of clay from the grade.

The transporting of materials for construction of highways has not been developed to its fullest extent and with the immense highway program that is being contemplated and will, undoubtedly, develop in practically every state in the Union, some money should be spent in the developing of proper equipment for the construction of highways. Railroads in the past have given the highway work whatever surplus cars they had from the hauling of other materials. No special equipment has been designed or prepared for highway work, yet during the next con-

TRACTOR PULLING BLADE GRADER.

struction season the transportation of materials for highways will be one of the largest industries of the country. The State of Kansas alone has financed $48,000,000 worth of highway work. We have now under construction work valued at $4,000,000 and will be able to put under way from $20,000,000 to $30,000,000 worth of work during the next construction season if contractors are available and willing to undertake the work under the present conditions in the roadmaking field.

CONCRETE—IN COLD WEATHER

CONCRETE work in cold weather can be carried on if the proper precautions are taken.

This is true of building construction work, but it is not advisable to start new road construction work in the winter.

The methods of protecting newly laid concrete from freezing have been carefully studied.

Some useful hints are set forth on this page.

Low temperatures retard the initial hardening of concrete.

So, when you work in freezing weather, heat the aggregates and water to a mass temperature of at least 80° F.

The methods of heating will depend on where the concrete is mixed.

If it is mixed at a central plant and the job is a big one, rotary heaters for aggregates will be profitable.

Another method is to throw jets of live steam into the piles of material before they go to the mixer.

But if the distance between loader and mixer is too great this scheme will not work.

Portable furnaces containing coils may be used for heating the water and types can be obtained which will burn various kinds of fuel.

It is easy to connect the portable furnace coils with the main supply line which will insure a continuous supply of properly heated water.

The temperature must be maintained as much above 45° Fahrenheit as possible for at least 10 days. Only by doing this can you be sure that the concrete will obtain the required strength.

A good light frame may be built and covered with canvas and heat may be supplied by lanterns, salamanders or steam coils.

Pipe heaters sometimes are used when aggregates are stored on the subgrade. They consist of sections of steel pipe over which the aggregates are piled and in which fires are built.

Be careful not to overdo the heat business because some materials such as flints and quartz gravels may be damaged by high temperatures.

When constructing buildings take advantage of every opportunity to keep your pile of material under cover.

Otherwise it is likely to become water soaked and possibly frozen solid.

When the concrete is laid it must be protected.

Hay, straw or canvas are the favorite materials for this purpose.

If snow or storms threaten, a foot or more of straw with canvas on top should be used.

One way to keep the canvas in place is to pile earth on the edges. If this is done it will keep out frost for many weeks.

Sawdust sometimes is used for protecting concrete from the cold.

However, it often stains the pavement and special care should be used in the selection of it.

Never use stable manure for covering finished concrete.

It develops acids which cause a pitting and scaling of the green concrete.

The use of chemicals to lower the freezing point of water or to accelerate the hardening of the concrete is not advisable.

But if absolutely necessary, calcium chloride may be mixed with the water. This will lower the freezing point of the water and accelerate the setting of the cement. Be careful not to use common salt.

Protect your workmen as well as the work they are doing.

For they don't enjoy the cold any more than the concrete does.

Furnish the concrete mixer with a shelter that will protect the engineer and fireman while they are working.

Also pay special attention to the men who handle cement at the mixer and are not working with warm materials.

Give all your men a chance to warm their hands and bodies from time to time.

If you do this they will work harder and better and you will make more money.

JAMES C. DUNN, RAILROAD CONTRACTOR

Better Known in Some Circles as Jim Dunn, Owner of the Cleveland Indians

A GREAT deal of good work can be done in 20 years and the trail of completed jobs that James C. Dunn has left behind him since he first ventured into the contracting business back in 1900 is testimony to the truth of the assertion which begins this sentence, paragraph and article.

Marshalltown, Iowa, gets the credit for producing Jim Dunn. In the first place, he was born there—"born with feathers on my legs" is the way he tells of his Hawkeye origin—in the second place, he embarked on his career as a contractor there, and in the third place his moral and financial support of the Marshalltown baseball team started him on the road toward his present big league position of owner of the Cleveland Indians.

JAMES C. DUNN

Coal and building materials were Mr. Dunn's stock in trade previous to 1900, when he switched to the contracting business. His response to the usual question about why he became a contractor was brief and to the point.

"I decided there was money in it," he said. Those who are wont to talk of the romance of building railways and bridges and roads would do well to ponder over Jim Dunn's frank statement of the urge that transformed him from a supply man to a contractor.

His first venture in contracting was some sewer and paving work for his home city, and for about 6 years the firm of Dunn & Mead, in which he was the senior partner, concentrated most of its efforts upon municipal work of one sort or another.

In 1906 Mr. Dunn went to Cleveland, where after a year in partnership with J. H. Keith, a Wisconsin man, he worked for 5 years without the luxury of a partner. During those 5 years he handled some pretty big jobs in various sections of the country, one of them being his first railroad contract, a job for the Carolina, Clinchfield and Ohio Railroad, down in North Carolina. Another job, and one of the best known of the lot, was the building of a concrete core wall for the Ashokan reservoir at West Hurley, N. Y. The Catskills were pretty far east for a Middle West contractor, but so long as the job was well done New York City's Board of Water Supply didn't worry too much about the contractor's origin.

The firm of Dunn-McCarthy Company was formed in 1914, T. F. McCarthy, another Iowan, having joined forces with Mr. Dunn three years before. It is still very much in the ring. Railway work is its favorite form of nourishment and all through the Middle West are cutoffs, yards, fills and other railway jobs that bear the Dunn-McCarthy trademark, or would if there were only some way by which a railroad contractor could label his work and so get the credit which really is his due.

One interesting piece of work that occupied Mr. Dunn's attention for some time was the rehabilitation of Pogue's Run, a stream which meandered through the railroad and business center of Indianapolis and always was causing trouble of one sort or another. The engineers designed a double concrete box and Mr. Dunn built it. The box was about 2 miles long and when it was finished Pogue's Run no longer overran its banks.

Elevating the Boston & Albany tracks through Worcester, Mass., was another Dunn job that used up 16 months of time and 100,000 yards of concrete.

The Pennsylvania Railroad has availed itself of the talents of Mr. Dunn's company in connection with several jobs, among them being the construction of its Indianapolis yards and the building of a cutoff near Frankfort, Ind. The Chicago, Milwaukee & St. Paul double tracking from Manning, Ia., to Council Bluffs is a Dunn job.

The list could be continued almost indefinitely, but what's the use? Any contractor who has all those railroads on his list of satisfied customers is well worth reading about, even if he never did anything else.

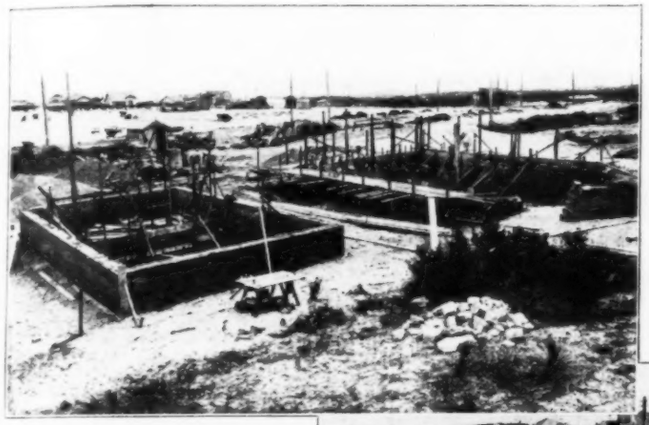
But, as mentioned in an earlier paragraph, Jim Dunn has done something else. A few years ago he bought the Cleveland baseball team, and, unlike some of his brother magnates, who spend their time groaning about their heavy expenses, Mr. Dunn admits frankly that the Cleveland team makes money. And it does more than that. It furnishes him with another channel into which to turn his thoughts when the toils and troubles of the contracting business grow heavy and monotonous. He goes to see his team play whenever he can do so without interfering with his business, and he follows its progress through the summer with a real enthusiasm which gives him fresh vigor and energy when he turns again to the more sober work of being one of the big railroad contractors of the United States.

THREE WEEKS

Americans and Australians Work Together and Build House in Record Time

HOUSES are just as scarce in the Antipodes as they are in the United States and the State government of New South Wales is engaged in an effort to better the situation, devoting its special attention to furnishing homes for returned soldiers.

Speed in building these houses is a most important factor and Mr. Hall, Minister for Housing, was broad-minded enough to realize that the only way to achieve rapid progress was to call upon all available help. One of



FIRST WEEK—THE START

the men who responded to this call was R. W. Menkins, an American engineer, who agreed to build a monolithic concrete house in 3 weeks' time.

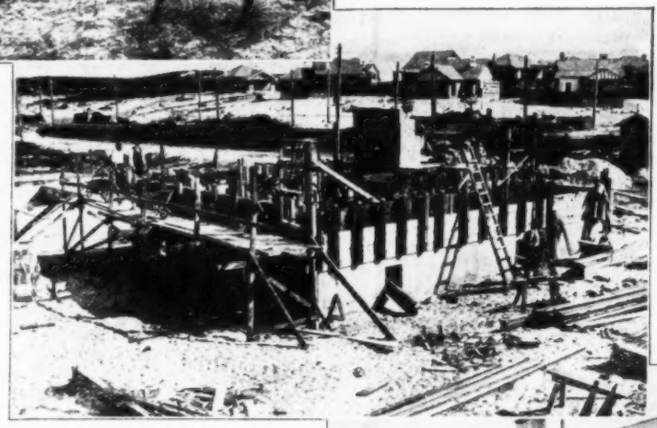
The photographs on this page show the beginning of the work, the job as it stood in the second week, and the completed house ready for delivery and inspection just 24 days after the first spade full of earth was turned. The 3 days in excess of the stipulated 3 weeks were accounted for by the fact that there were 4 or 5 days of rain on which it was impossible to work. It will be noticed that the photograph of the completed house shows the American, British and Australian flags intertwined, a good indication of the harmony that existed between Mr. Menkins and the local authorities during the progress of the work. The Minister for Housing was enthusiastic about Mr. Menkins and the accomplishments of the American concrete mixers. It is probable that Mr. Menkins will be called upon to build many more houses, especially as the Minister's program calls for at least 1,000 houses a year.

There are many advantages in building this type of concrete house. It can be built largely by unskilled labor. It can be erected quickly, is fairly cheap and the design can easily be altered to avoid having a great number of houses exactly alike. It has every advantage with respect to durability and permanence that is claimed for brick.

These houses will sell for about £750 complete with basement, electric light, gas, concrete sidewalks and sod lawn. Right of ownership is to be decided by ballot, drawings being held fortnightly. The buyer pays a small deposit and the balance as rent, 3 shillings a week for every hundred pounds the property is worth being a rental basis. By this plan a cottage and land worth £800 (about $3,880) will cost its owner 24 shillings per week, about $6.00 in American money.

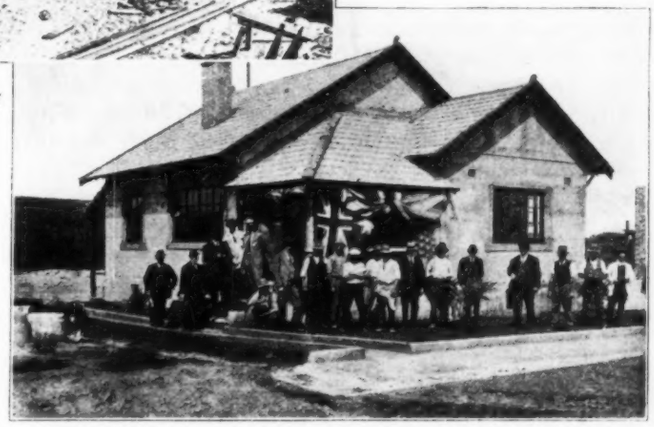
The house illustrated was built near Matraville. The following comment upon Mr. Menkins' work was made by Mr. Hall, the Minister for Housing:

"It is a triumph of hustling, as the cottage has been erected in 3 weeks and certainly reflects credit on Mr. Menkins, the contractor. Since I have been Minister for Housing I have had many people presenting to me schemes for concrete buildings for consideration; but when told to build one these people did not come up to the scratch. Mr Menkins was sent for and asked to build a cottage in 3 weeks and here we have the finished article."



SECOND WEEK—HALF WAY

"If," Mr. Hall added, "the construction of concrete buildings should prove as successful as seems likely, this will open tremendous possibilities. It would no doubt be a good thing for New South Wales if one could make arrangements to build 1,000 houses immediately, but any extensive operations in this connection would cause a breakdown in the labor market. Bricklayers are scarce now, and contractors and the government have to pay in excess of award rates.

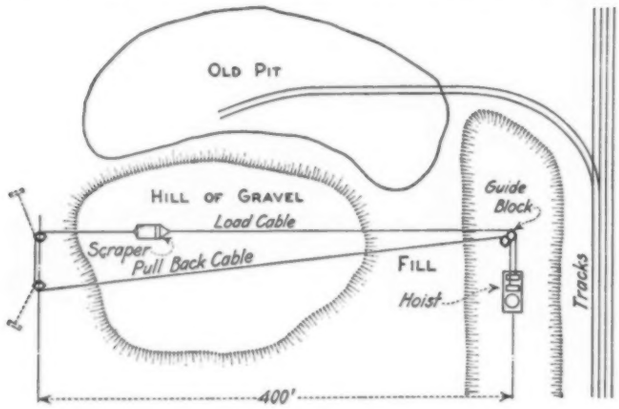


THIRD WEEK—THE FINISH

Besides building the concrete houses, Mr. Menkins hopes to obtain contracts from the government for several miles of concrete roadway and sidewalks. His success proves that in the hands of the right sort of man who understands what real cooperation is, American machinery has a place in Australia.

STRIPPING OVERBURDEN

A bottomless bucket is used in removing the overburden from a hill to get at the sand and gravel underneath by the Diamond Sand & Gravel Co., at Bedford, O. The top of the hill is being scraped off and deposited



in a ravine at one end of the hill. The accompanying sketch shows the layout of the installation.

The scraper is operated by a 90-hp. electric hoist, which is set up on high ground across the ravine. The hoist is arranged so that the rear drum operating the "pull-back" cable has a speed three times as great as the front drum. The machine requires one operator and a rigger stationed at the guide blocks to make the necessary shifts in the line of operation.

The top soil of the hill is largely clay and runs from nothing to 6 ft. in depth. Hard "shoulders" of clay, when encountered, are removed by "sawing" the scraper back and forth over the obstruction. A day's output will fluctuate between 200 and 300 yd., depending on the nature of the material.

BROAD TIRES FOR YIELDING SAND

Specially constructed wheels with tires 6 in. wide were used on No. 2 wheeled scrapers employed by A. R. Hartigan Company, contractors, in excavating yielding sand at Indiana Harbor, near Chicago. The wide tires were found very helpful in reducing the draft and increasing the output of the scraper outfit.

OXYACETYLENE WELDED JOINTS STRONG

Tests of the strength of oxyacetylene welded joints have been made at the University of Illinois. Results show that for repeated stress the joint efficiency seems to be about 100% for plates ½ in. or less in thickness, while the efficiency of the material in the joint is somewhat less. Hammering or drawing the weld while hot increases the strength. Annealing from 800° C. lowers it.

For static tests and for repeated stress tests, the joint efficiency sometimes reaches 100%; the efficiency of the material in the joint is always less. This indicates the necessity of building up the weld to a thickness greater than that of the plate.

The impact tests show that oxyacetylene welded joints are decidedly weaker under shock than is the original material; for joints welded with no subsequent treatment; the strength under impact seems to be about half that of the material.

If the welded joint is worked while hot the impact-resisting qualities are slightly improved, though this does not make the joint equal to the original material in impact-resisting qualities. Annealing from 800° C. seems to have very little effect on the impact-resisting qualities.

Results tend to increase confidence in the static strength and in the strength under repeated stress of carefully made oxyacetylene welded joints in mild steel plates.

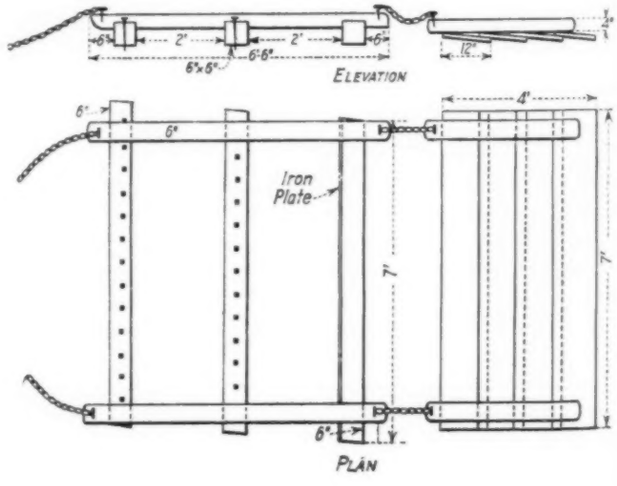
MAKING LAND BY DREDGING

In canalizing the Hudson River at Waterford, the Dunbar & Sullivan Dredging Co. made a fill by digging a "dumping channel" parallel to the river and in an area of low land that was to be used for a spoil bank. An entrance channel was dug at one end of the dumping channel so that scows could enter. The channel was dug with two dragline excavators, one on each side. The material, which was nearly all shale, was blasted and loaded into scows with a 4-yd. dipper dredge.

The dumping channel was 110 ft. wide and 12 ft. deep. Into this channel the loaded scows were towed. The shale was dumped into the channel and transferred to the spoil bank by the dragline scrapers. The draglines worked part of the time on the channel digging and part on the shale handling. When the spoil banks on each side of the channel were completed, the channel was filled with shale. In this manner a spoil bank was made 400 ft. wide and 90 ft. high.

ROAD SMOOTHER

An economical outfit for maintaining sand-clay roads which have developed bumps, due to heavy travel, is illustrated. This smoother was developed by D. H. Winslow, maintenence engineer of the North Carolina Highway Commission, and is extensively used on sand-clay road



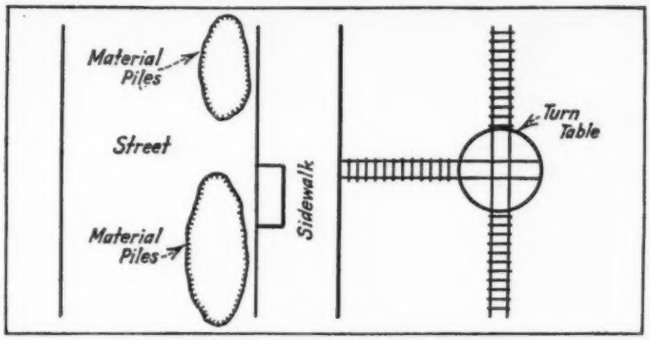
maintenance. The teeth loosen up the bumps, which are hard, even after a heavy rain, and the plank float behind smooths the surface. The whole outfit may be drawn by a light tractor or a motor truck.

UNDER THE SIDEWALK

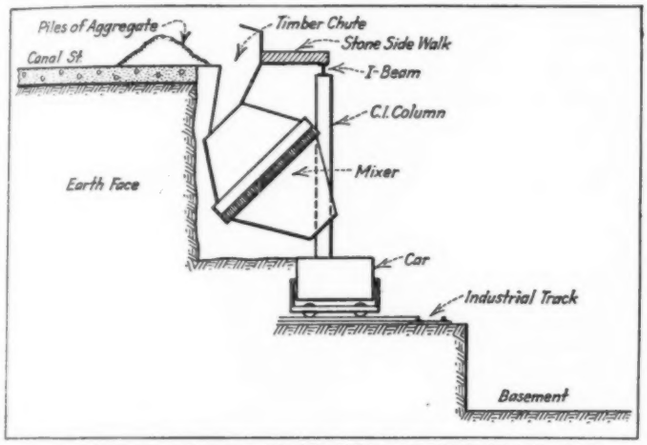
THE accompanying diagrams show how part of the concrete for the foundation walls of the new Union Station in Chicago was mixed and handled. Materials were piled in Canal St. and an electrically driven mixer was placed under the flagstone sidewalk, which was supported by an I beam resting on cast iron columns. A hole was cut in the sidewalk near the curb and a timber chute built from the hole to the mixer. Aggregate was proportioned by wheelbarrow loads, wheeled only a few feet and dumped down the chute into the mixer.

Industrial track was laid around the excavation about halfway between the ground elevation and basement level and a turntable was placed opposite the mixer. When filled, the cars were pushed out, turned and delivered to wherever the concrete was being poured. Here the cars were dumped, the concrete going down another wooden chute to the forms.

A large volume of cement was handled economically in this way, as gravity did a large part of the moving.



THE CONVENIENT TRACK LAYOUT



A DIRECT ROUTE—SIDEWALK TO MIXER TO CAR

IMPORTANCE OF ROAD IS REALIZED

John S. Cravens of the Council of National Defense says:

"The vehicle and the road must be demonstrated to be complements of each other and inseparable parts of a great agency of public service.

"It is a fact that the people are beginning to understand what roads mean—not as a means of enjoyment, nor a convenience—but as a great factor in the economic growth of the country."

BID PRICES ON ILLINOIS ROAD CONTRACTS

Comparison between Summer and Autumn Lettings

FOUR months ago SUCCESSFUL METHODS printed a statistical analysis of the unit bids received by the Illinois State Highway Department in the four best lettings of the summer season. This table was prepared by C. W. Olson and he has just completed another analysis which compares the bids received during the July and August lettings with those of the September and November lettings. It will be noted that there is a great increase in the bid prices of practically all materials and in many cases the variations are remarkably large.

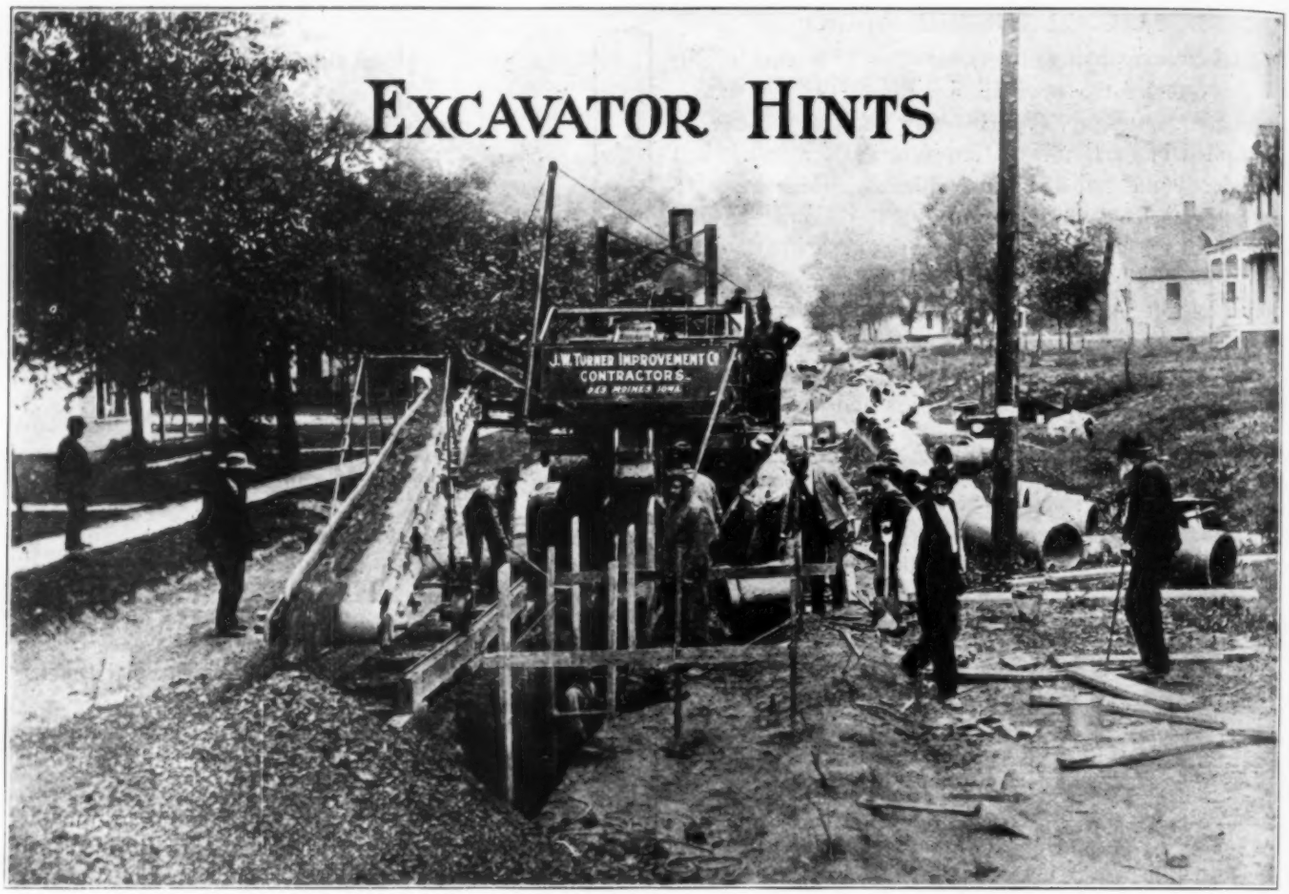
COMPARATIVE 1919 BIDS, ILLINOIS HIGHWAY DEPARTMENT.

Showing figures of major items, comparing July-August lettings with those of September-November under the headings of Summer and Fall. Prepared by C. W. Olson of Conkling, Price & Webb, Chicago.

Class	Unit	Quantity	No. of Bids	Low Bids Sumr.	Low Bids Fall.	High Bids Sumr.	High Bids Fall.	Average Sumr.	Average Fall
Ecav. earth	cu. yds.	1,365,466	184	.50	.50	1.83	2.00	.85	1.04
Borrow earth	cu. yds.	288,828	74	.55	.60	2.00	1.85	.96	1.03
Excav. in rock	cu. yds.	19,267	11	2.50	2.50	5.50	4.00	3.66	3.30
Earth	sq. yds.	1,716,501	152	.03	.07	.30	.20	.11	.13
Earth Roadway	sq. yds.	641,924	25	.02	.01	.15	.15	.08	.07
Class A. Conc	cu. yds.	18,350	166	18.00	20.00	40.00	50.00	23.56	29.83
Class B. Conc	cu. yds.	1,985	105	15.00	22.80	40.00	50.00	21.85	30.93
Class X. Conc	cu. yds.	974	11	20.00	30.15	30.00	30.15	26.25	30.15
Conc. Curb	lin. ft.	60,640	32	.40	.25	1.50	1.00	.70	.58
P. Cement Pave	sq. yds	2,166,413	150	1.31	1.70	3.50	2.88	2.09	2.30
Rein. Steel	lbs.	1,524,352	132	.04	.06	.11	.15	.07	.08
Struct. Steel	lbs.	446,978	12	.08	.11	.15	.11	.095	.11
Mono. Brick	sq. yds.	390,898	15	3.30	3.35	5.71	3.75	3.97	3.55
Gravel Pave	sq. yds.	4,508	9	1.50	1.60	1.66	1.88	1.60	1.74

Note: Above bids are based on cement furnished by the State. The State also provides 100 per cent advance of freight and material bills, charging to jobs as used.

EXCAVATOR HINTS



WHEN spudding down the sides, the bank should be broken off a little at a time as close to the buckets as possible.

Keep buckets moving when sides cave and hoist boom clear of cave.

Trench braces should be placed as close as possible and parallel to boom.

When making a turn with a ladder type boom machine care should be taken not to crowd boom against bank. An oscillating type machine will cut on a 25-ft. radius. A ladder type excavator will turn a right angle in about 150 feet.

Manholes can be spudded down—machine elevating all material.

The boom should be lifted clear of the trench and rested on a support to relieve strain on cables and to protect boom from cave-in.

Always put support under boom to safeguard workmen underneath.

Large, loose stones should be taken from trench by workmen. Although machine may elevate them, no chances of delaying operations should be taken.

When digging down to a ledge of rock, do not try to dig in with bucket teeth.

Obstructions, such as sidewalks, pipes, etc., can be undercut by reversing digging traction.

Bracing should be of ample strength to preserve the trench and to safeguard the workmen.

Trench should be braced where sewer pipe is broken and in places where water is seeping through sides of trench.

Keep bucket teeth sharp. In hard digging keep a spare sharpened set on hand.

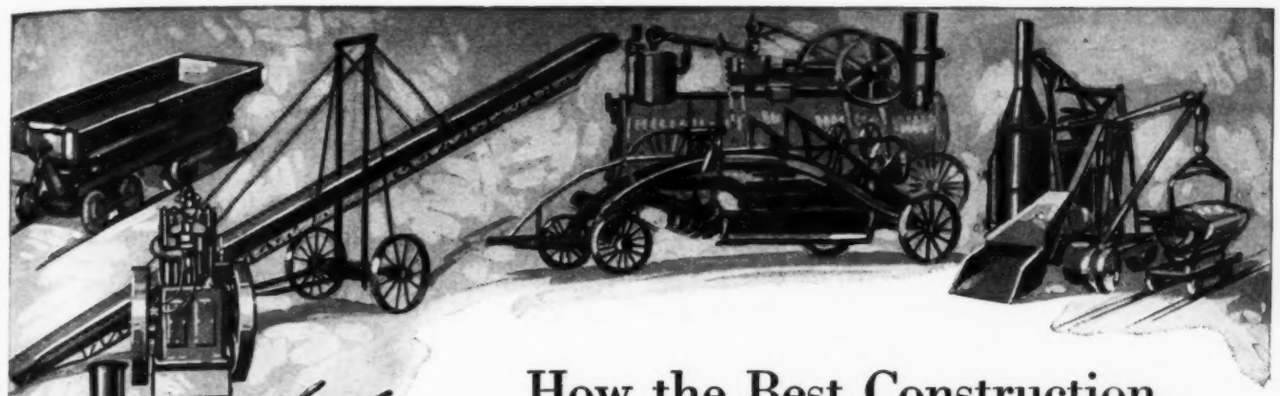
It is essential to the life and proper operation of a machine that all bolts and parts be always tight. Go over entire machine and tighten all bolts once a day.

In loading use heavy plank or timbers properly supported. Make runway of sufficient length to keep boom from dragging. Block wheels at all times.

Keep machine level so that sides of trench will always be perpendicular. A few boards under the wheels on the low side will do the trick.

Keep a record of your machine's performance. Then you will know just how much it earns for you.

Watch out for signs that indicate lack of proper lubrication. A little oil at the right time will often save trouble and money.



How the Best Construction Machinery is Placed Before All Users

The Same Service Abroad as at Home

USERS of construction machinery abroad can get through our organization the same advice and service that is available to buyers in the United States.

The men in our branch offices have the experience which qualifies them to act as your machinery experts.

Those men are backed by the engineers and the products of a group of the most reliable manufacturers in the United States. This group includes all of those whose advertising appears in this publication.

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51 Chambers Street, NEW YORK

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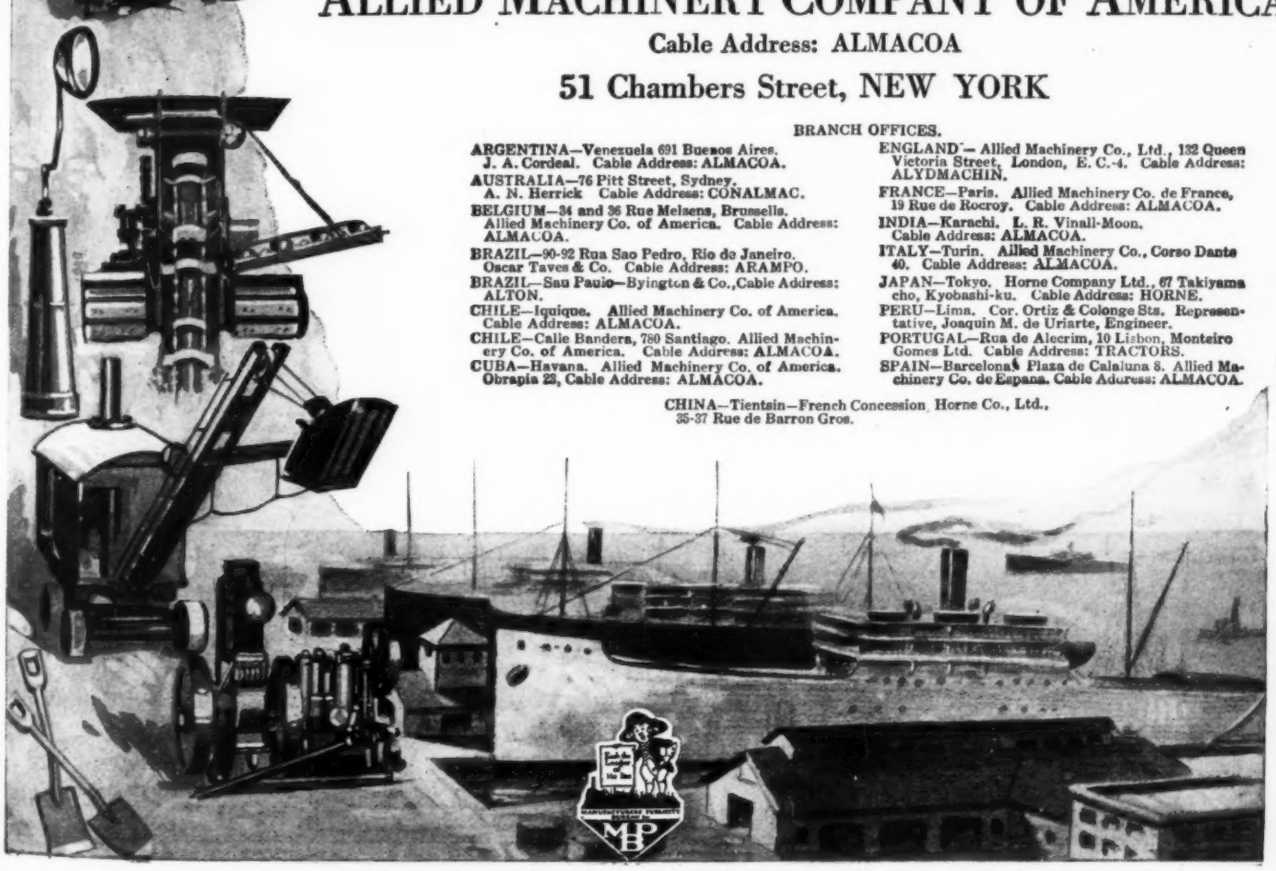

14
The WYOMING
SHOVEL WORKS

Who Made That Shovel?

The time to know is when a shovel has made good or fallen down — not when the paint is still fresh. The photograph opposite represents an illustration of this point—and "thereby hangs a tale"—

Not so long ago, a Wyoming representative called upon a certain purchasing agent and found him in a red hot state of mind.

"Who made that shovel?—I have asked every shovel man and they all deny reponsibility," was the question fired like a rifle bullet (take a look at the shovel and you'll know why the heated atmosphere).

"I might be able to guess, but I won't, that is between the maker and you, who bought it—but there is one thing sure—it is not a Red Edge!" came the pat answer.

"How the h_____ can you say that?"

"Here's how" (taking the shovel and pointing to the blade).

And here's the point to the story.

One Shovel Not Afraid to Be Called By Name!

Wyoming Red Edge Shovels bear a clean-cut imprint of their maker's name on the blade. You can read this identification as long as there's any blade left. It's branded into the steel; branded before the heat treatment so that it *stays.* It can't be removed.

Other shovels as a rule, when new, bear a label. So does the Red Edge, and it carries the Red Edge as a further aid to easy identification.

But service takes off the label and takes off the paint. Then is when you really know your shovel's worth. We are not ashamed to provide ready identification for Red Edge Shovels, not only when they are new but at any stage of their long and useful life. And if some other shovel "falls down," we don't want Red Edge blamed. Hence our care in marking them.

Look for yourself at used shovels. Note the "orphans" which you cannot identify—and note the Red Edge. You will see why we are not ashamed of our product.

THE WYOMING SHOVEL WORKS
Wyoming, Pa.

NEW YORK 141-149 Centre St.
CHICAGO 347 Peoples Gas Bldg.
BOSTON 118 Pearl Street
PHILAD LPHIA 1234 Commercial Trust Bldg.
ATLANTA 810 Candler Bldg.
SPOKANE 336 First Avenue
SAN FRANCISCO 268 Market St.

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The WYOMING SHOVEL WORKS

THE AUSTIN-WESTERN ROAD MACHINERY CO.

For Every Step in the Building of Dirt and Macadam Roads

The Part that Austin-Western Machines and Methods Will Play in the Enormous 1920 Road Program

More road building this year than ever before—and Austin Western is ready.

For every step in road-work, from sub-grade to surface, the Austin-Western line includes not one, but a variety of machines.

AND MARK THIS POINT: There's no duplicating. The range of machines gives the Road Builder every chance to pick a machine absolutely suited to his work.

Austin & Western Machinery has been used by the Public for more than 40 years — a nation-wide — old-established organization — well equipped for rendering service.

Austin-Western service includes 19 branch houses and warehouses located at strategic points throughout the country. It is a service for all Austin-Western machines, old or new.

At most of these conveniently located branches are kept stocks and repair parts—hardly ever more than over-night transportation to any part of the United States. How important this is to the man on the job.

On the following pages we review a few of the many road building processes in which Austin-Western machines play a part.

THE AUSTIN-WESTERN ROAD MACHINERY CO.

CHICAGO

NEW YORK	BOSTON	RICHMOND	COLUMBUS	NEW ORLEANS
ALBANY	PHILADELPHIA	CHARLESTON	LOUISVILLE	JACKSON
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THE AUSTIN-WESTERN ROAD MACHINERY CO.

The Problem of the Sub Grade

Excavating the sub-grade is frequently a difficulty and is always hard work.

Whether it is a simple plow and scraper job or calls for special tools, the Austin-Western Line covers it.

FOUR sizes of elevating Graders.

THREE different Scarifying Tools.

TWELVE different Graders.

And a Combination Grader and Scarifier.

The Austin Rip Snorter

Supplied for either horse or tractor haulage, whichever the job demands.

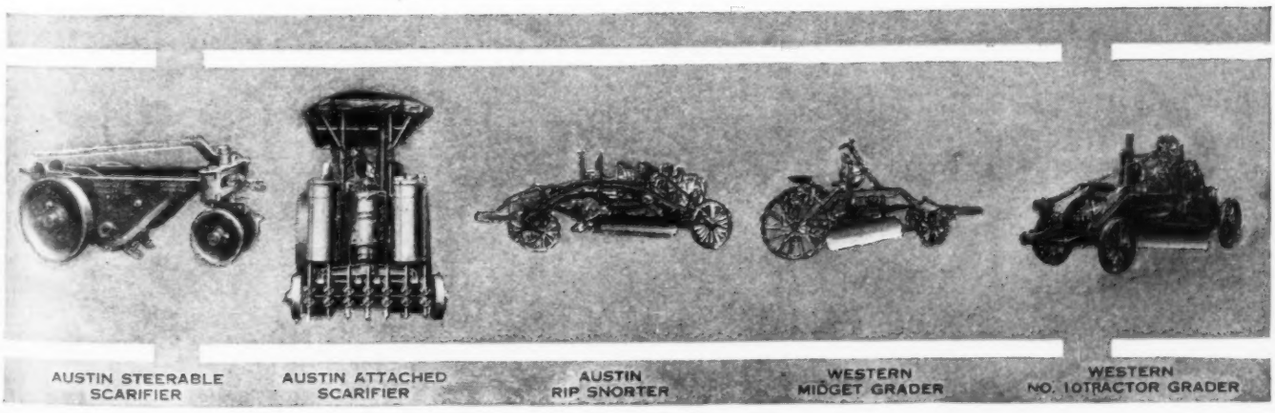
The Austin Rip Snorter is the road contractor's answer to his greatest problem—the old, hard, rutted Macadam road, too much out of shape to be worked with a grader. Here a powerful scarifier is combined with the grader. It works out the material and regrades in one operation. Use either independently or the two combined.

Then there is the Austin attached scarifier, operated and controlled by one man on an Austin Steam or Motor Roller. The scarifier lifts easily when you want to use the roller alone and is ready for work on a minute's notice.

The Austin Steerable Scarifier, used in conjunction with an Austin or Western Grader, can be hauled by a power roller or an ordinary size tractor. It's a heavy powerful rooter which digs into and does well the toughest jobs.

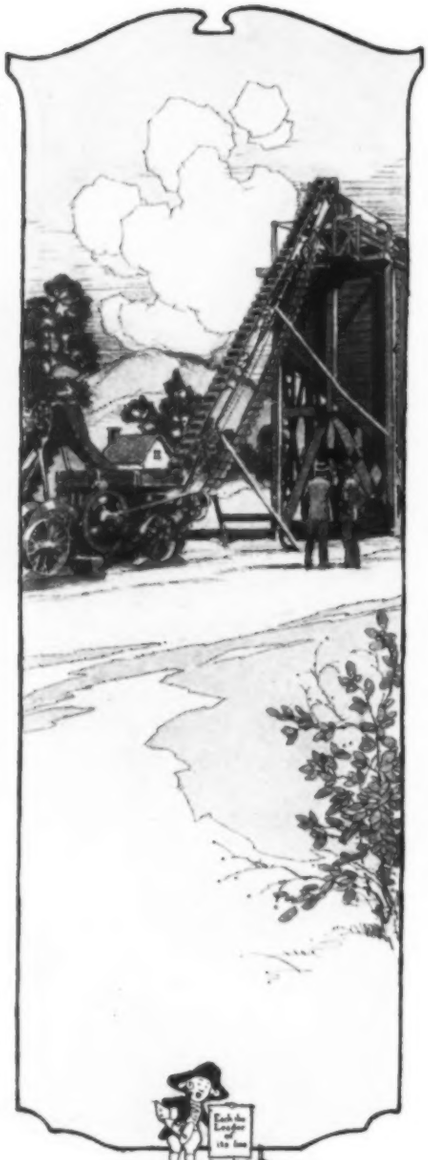
We show two of the twelve Austin and Western Graders—the Midget, a little 2-horse, one-man machine and the No. 10 Traction Grader—the "He Man" of graders; guaranteed for any size of tractor.

No question of fitting your job to the machine; come to the Austin-Western for the machine fitted to your job.



AUSTIN STEERABLE SCARIFIER | AUSTIN ATTACHED SCARIFIER | AUSTIN RIP SNORTER | WESTERN MIDGET GRADER | WESTERN NO. 10 TRACTOR GRADER

THE AUSTIN-WESTERN



Austin-Western Crushing Plants

Two Types of Crushers—A Full Line of Equipment

Here again the completeness of the Austin-Western line offers a wide choice, both in type and size.

Not only in Crushers, but in screens, elevators, quarrycars, hoists, bins, etc.

The Aurora "Two-Blow Stroke" has the most efficient and advanced type of construction known in jaw crushers. Its "Two-Blow Stroke" for each revolution of the crankshaft increases production and reduces vibration. Wearing parts are reduced to a minimum—toggle plates and springs being done away with entirely.

The Aurora Crushers are made in THREE SIZES — and in PORTABLE or STATIONARY types.

Western Bins, Screens, Elevators, are made of high grade material and in standard sizes and capacities to suit Aurora Crusher Plants.

Western Folding type of elevators is specially adapted for portable work—a time saver in setting up and transporting.

AUSTIN GYRATORY CRUSHERS are made in both portable and stationary styles and in a range of sizes to suit every quarry man's needs. Capacities 50 to 100 tons per day.

THE AUSTIN-WESTERN

NEW YORK	BOSTON	RIC
ALBANY	PHILADELPHIA	CH
DALLAS	ST. PAUL	NA
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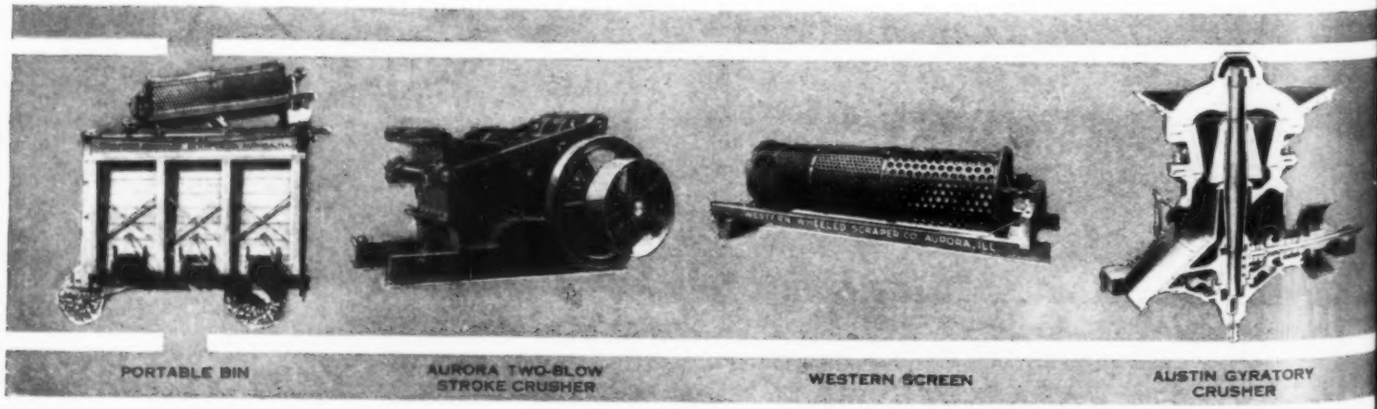
During the war the U... purchased over 700 Aust... their combined purchases

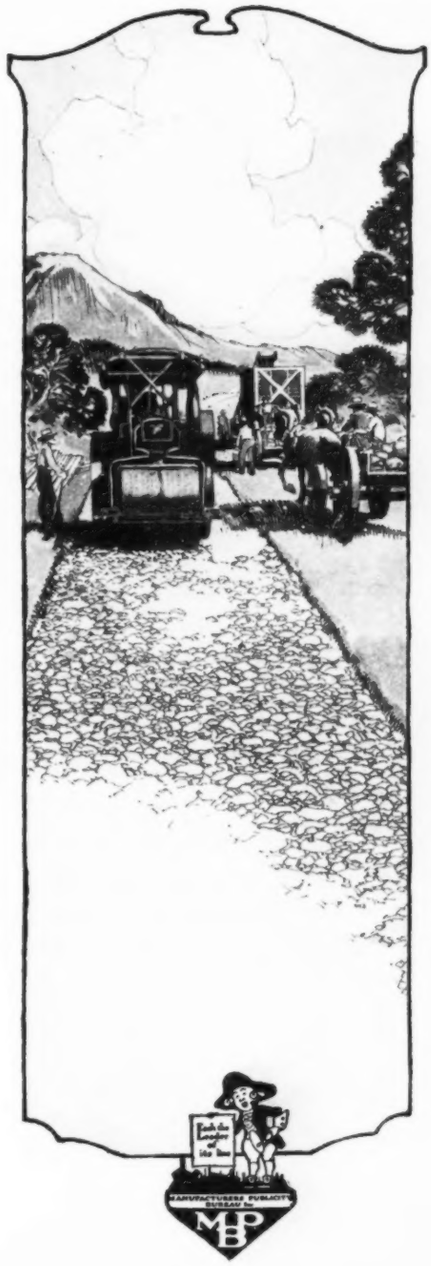


PORTABLE BIN | AURORA TWO-BLOW STROKE CRUSHER | WESTERN SCREEN | AUSTIN GYRATORY CRUSHER

OAD MACHINERY CO.

A Roller for Every Job!

Motor Rollers—Steam Rollers and Others



For every class of road-rolling, there's an Austin Roller.

Motor Roller or Steam, as you wish. A complete range of sizes, ith many exclusive points of advantage.

Austin Steam Rollers have greater steam space and heating ea, by far, than any other steam roller. Austin Motor Rollers e universally conceded to be the leaders of their line.

The Austin Motor Roller is made in both 3-wheeled and tandem pes. The 3-wheeled has two speeds, steel gearings, practical lf-starting device, simple high grade ignition-7, 8, 10, 12, 15 tons.

Austin Tandem Rollers are the paving contractor's "first aid to ofits." They show a big reduction of running costs and a big crease of work done. Steady running; low center of gravity, t high-road clearance; easily controlled power steer; two gear eeds.

Write today for catalogs and full information on the Austin line rollers. The Austin-Western line includes everything for Ma-dam and gravel road building and maintenance.

AD MACHINERY CO.

RIC COLUMBUS NEW ORLEANS
CH LOUISVILLE JACKSON
NA SAN FRANCISCO PORTLAND
AT LOS ANGELES

the Un Allied Governments 00 Aus ore than ten times rchases nd at higher prices

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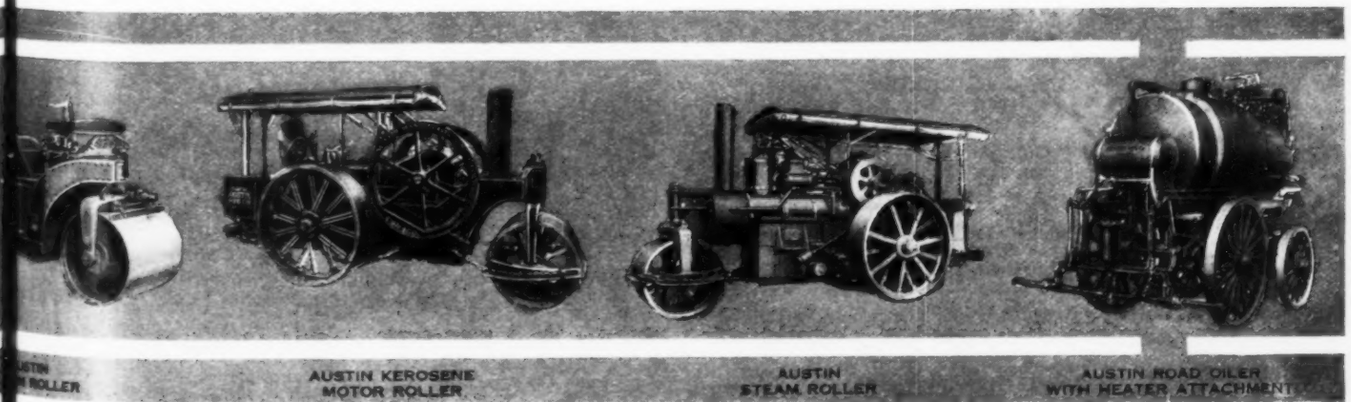


AUSTIN ROLLER | AUSTIN KEROSENE MOTOR ROLLER | AUSTIN STEAM ROLLER | AUSTIN ROAD OILER WITH HEATER ATTACHMENT

Railroad Grading **Irrigation Canals** **Embankments**
Drainage Ditches **Levee Building**
Wagon Loading **Highway Grading**

The history of railroad and earth construction work for the past 35 years has been the story of THE NEW ERA ELEVATING GRADER.

Old experienced contractors still "in the game" as well as many who have "passed along" learned years ago to look upon the "NEW ERA" as the most essential piece of equipment on a successful grading job.

PRESENT DAY road builders have recognized the advantages of the "New Era" in solving their grading difficulties. It is good for both grading and excavating the road bed; in the latter case getting the material out of the grade to the wagon or ditch *in one movement* is a worth-while labor-saving achievement.

AUSTIN MANUFACTURING COMPANY

NEW YORK **CHICAGO** **SAN FRANCISCO**

Canadian Agents: Mussens, Limited, Montreal, Toronto, Winnipeg, Vancouver

ALMACO — EXPORT DEPARTMENT ALLIED MACHINERY COMPANY OF AMERICA — ALMACO

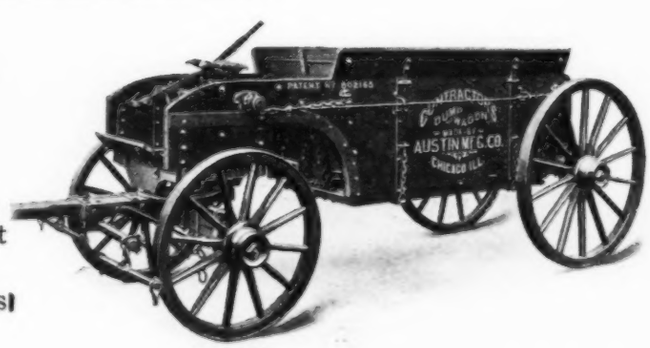
Austin Dump Wagons

are popular with contractors because they are

Easy to load (being low).

Easy on teams (having short wheel base).

Easy to dump (hingeless doors clear the material).



CLYDE

Big Job Hoists

THE building program now under way calls for ***dependable*** equipment. To speed the work without hitch or delays machines must stand heavy punishment — must deliver their daily output and never fail the contractor.

Clyde hoists are found on the big jobs because contractors ***know*** Clyde Equipment. Where you crowd work on machinery day in and day out that equipment must stand the test.

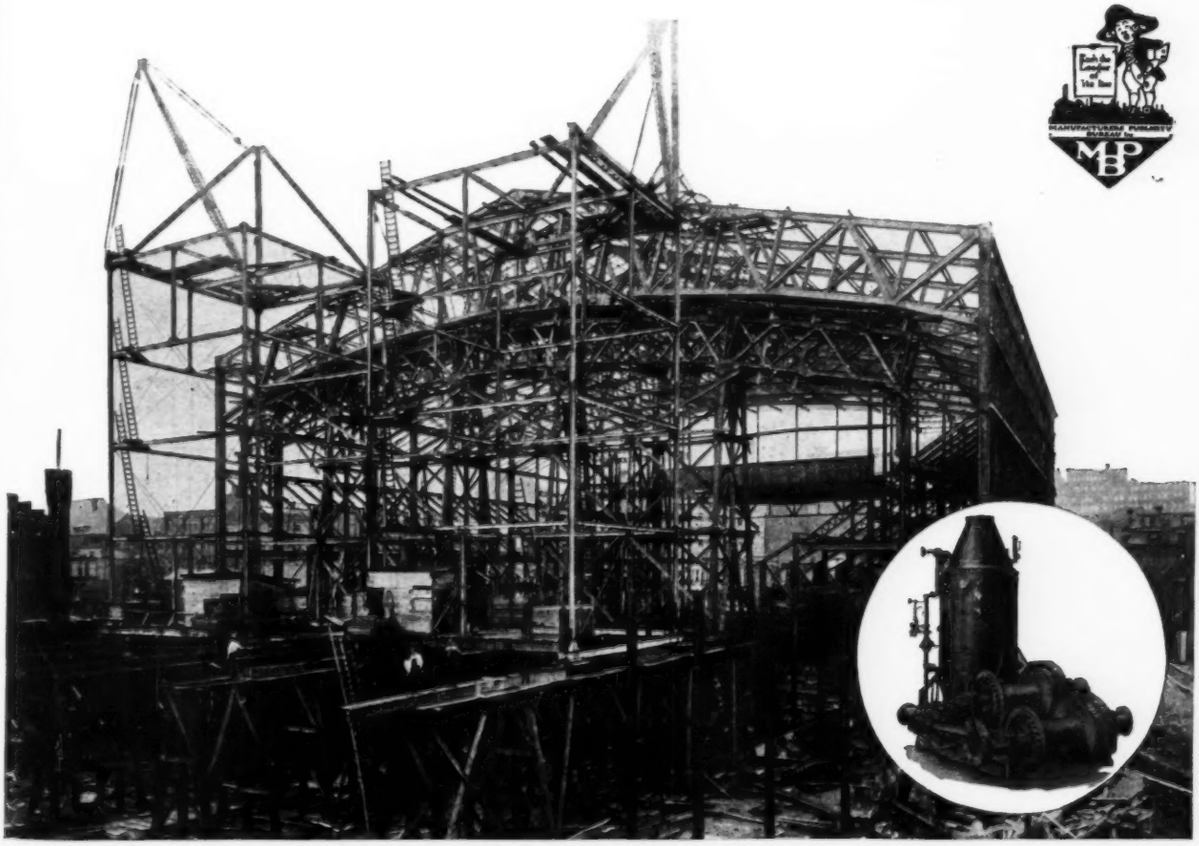
Clyde hoisting machinery is found the country over doing its part in the big construction program. Below is a picture of the Public Hall or Auditorium now being built by the city of Cleveland. Clyde Hoists are used. Write for bulletin on Clyde Equipment.

CLYDE IRON WORKS

Duluth, Minnesota, U. S. A.

Branch Offices and Warehouses:

NEW ORLEANS—414-416 Carondelet St. CHICAGO—11 S. La Salle St. SEATTLE—542 First Ave., South
SAVANNAH—501 Germania Bank Bldg. NEW YORK—50 Church St. PORTLAND—18th & Upshur Sts.



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LAKEWOOD BUILT TO LAST

The Foundation
Stored Materials

THE long, low line of stored material pictured at the bottom of the page spells success. The Lakewood Tunnel System of storing material for concrete highway construction was developed by Lakewood engineers out of experience gained in the long and successful use of similar storage methods on other classes of construction work.

The advantages of tunnel storage are:

(1) Unlimited storage at a relatively low cost;
(2) Ease of loading all of this stored material with little rehandling;
(3) Ease of moving to a new location;
(4) Few men required for installation; and
(5) Simplicity and speed of installation.

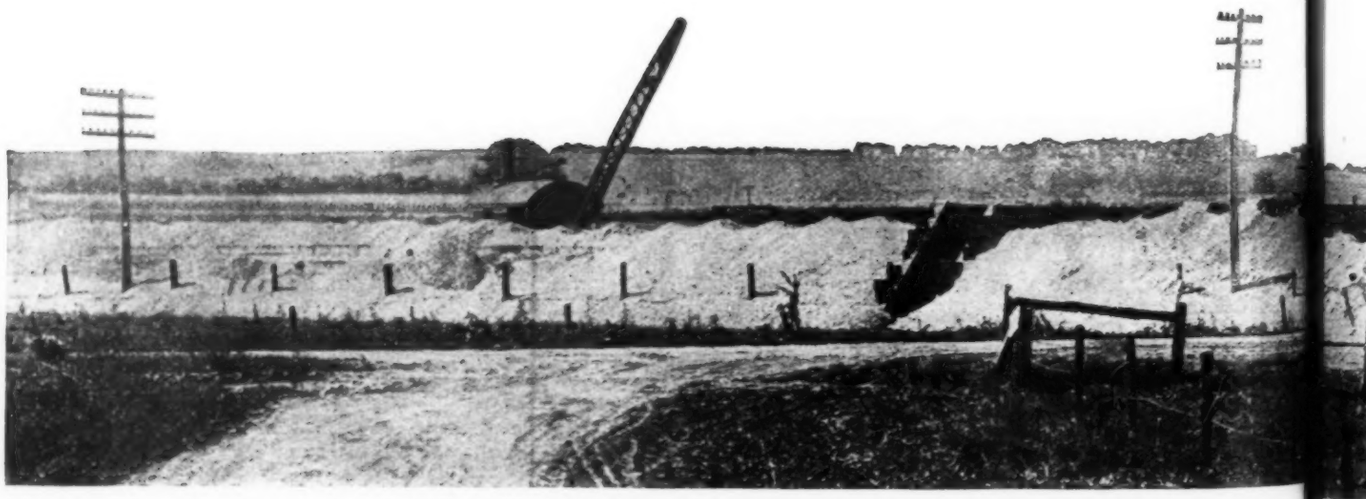
And many engineers allow monthly estimates on material properly stored.

Lakewood engineers have layouts and detailed plans for many installations that have been successfully used.

They are glad to serve you. That is the Lakewood Idea.

Get in touch with Lakewood.

This is the material yard of the Dunnegan Construction Company at Morrison, Illinois.



Lakewood Road Co

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LAKEWOOD BUILT TO LAST

# of Production
Sure Haulage

THE "neck of the bottle" in building concrete roads is keeping the mixer supplied with material. This necessitates reliability in the road to the mixer. What road is more reliable and independent of weather conditions than a road of steel?

Delivering large quantities of material means hauling heavy tonnage. What road is better fitted for hauling heavy tonnage than a road of steel?

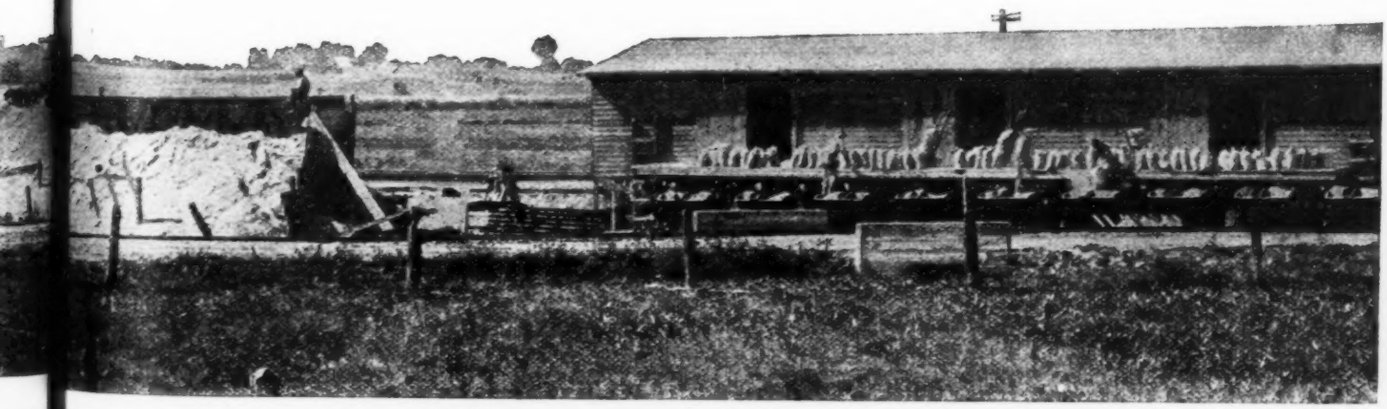
Lakewood cars, engines, track and switches have been developed to fit the particular needs of highway construction. They are built for hard use—and they stand it. Ask the contractors who use Lakewood road haulage equipment.

Material Unloading and Storage and Narrow-gauge Haulage are but two of the units of the Complete Lakewood Road Plant. Investigate the Batch Transfer and Mixing unit, the Finisher and the Subgrader. Get the ideas of Lakewood engineers as to plant layouts and operating costs. They know how other contractors have succeeded.

Write for Bulletin 29-C.

THE LAKEWOOD ENGINEERING CO.
Methods and Machines
CLEVELAND, U. S. A.

Offices in New York, Boston, Philadelphia, Washington, Atlanta, Pittsburgh, Detroit, Chicago, Milwaukee, Salt Lake City, Los Angeles, Seattle, Kansas City, Oklahoma City, Dallas and San Francisco.



nstruction Plant

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Lakewood Cons

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